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Payment for Environmental Services in Southeast Asia: A Regional Review of Policy Implementation

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Front cover photo credit: Payment for Forest Environment Services project in Lam Dong Province, Vietnam by Nguyen Thi Y Ly

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The Economy and Environment Program for Southeast Asia (EEPSEA) was established in May 1993 to support training and research in environmental and resource economics. Its goal is to strengthen local capacity in the economic analysis of environmental issues so that researchers can provide sound advice to policymakers.

To do this, EEPSEA builds environmental economics (EE) research capacity, encourages regional collaboration, and promotes EE relevance in its member countries (i.e., Cambodia, China, Indonesia, Lao PDR, Malaysia, Myanmar, Papua New Guinea, the Philippines, Thailand, and Vietnam). It provides: a) research grants; b) increased access to useful knowledge and information through regionally-known resource persons and up-to-date literature; c) opportunities to attend relevant learning and knowledge events; and d) opportunities for publication.

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All opinions, viewpoints, analyses, and suggestions in this report are those of the authors and do not necessarily reflect the views of EEPSEA. The authors are responsible for all mistakes and shortcomings in this report.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
1.0 EXECUTIVE SUMMARY	1
1.1 Problem Statement	1
1.2 Research Questions	2
1.3 Research Objectives	2
1.4 Research Scope	3
2.0 RESEARCH METHODS	3
2.1 Review of PES Case Studies	3
2.2 PES Preparation and Implementation	4
2.3 PES Evaluation	4
3.0 FEATURES OF SOUTHEAST ASIAN COUNTRIES	5
3.1 Land Area and Population	5
3.2 Economic Development and Environment Issues	6
3.3 Land Ownership	7
4.0 REVIEW OF CASE STUDIES ON PES IN SOUTHEAST ASIAN COUNTRIES	7
4.1 Cambodia	13
4.1.1 CASE 1: Agreement for Forest, Wildlife, and Crocodile Habitat Protection in Chumnoab	13
4.1.2 CASE 2: Payments for Biodiversity Conservation in the Context of Weak Institutions	14
4.1.3 CASE 3: Oddar Meanchey REDD project	16
4.2 Indonesia	18
4.2.1 CASE 1: Combining Environmental Service Markets for Carbon and Watershed Functions in Singkarak Watershed	18
4.2.2 CASE 2: Way Besai Watershed	20
4.2.3 CASE 3: Protection of Cidanau Watershed	23
4.3 Philippines	25
4.3.1 CASE 1: Maasin Watershed Reserve Forest	25
4.3.2 CASE 2: Mt. Kanla-on Spring Water Plant	28
4.3.3 CASE 3: National Power Corporation Watershed Rehabilitation Funds	29
4.4 Vietnam	31
4.4.1 CASE 1: Assessing an Economic Approach to Sustainable Forest Management	31
4.4.2 CASE 2: PFES Pilot Implementation in Lam Dong Province from 2006-2010	33
4.4.3 CASE 3: Avoided Deforestation and Forest Degradation (REDD) in Da Nhim Watershed	35

5.0 EVALUATION OF PES IMPLEMENTATION IN SOUTHEAST ASIAN COUNTRIES	36
5.1 General Effect of the PES and PES-like Mechanism	37
5.1.1 Influence on environmental services	37
5.1.2 Economic effect	38
5.1.3 Other social implications	40
5.2 Analysis of the Efficiency of These Programs	41
5.3 Equity Analysis	43
5.4 Legal Feasibility	45
5.5 Financial Feasibility	47
5.6 SWOT Analysis	49
6.0 CONCLUSIONS AND RECOMMENDATIONS	51
REFERENCES	54
APPENDICES	58
Appendix 1. Checklist frame for reviewing PES context in each case	58
Appendix 2. Checklist for PES process analysis	59
Appendix 3. PES evaluation framework	60

LIST OF TABLES

Table 1. General characteristics of countries in Southeast Asia	6
Table 2. Forest area in Southeast Asian countries	7
Table 3. Payment for environmental services case studies in Cambodia	9
Table 4. Payment for environmental services case studies in Indonesia	10
Table 5. Payment for environmental services case studies in the Philippines	11
Table 6. Payment for environmental services case studies in Vietnam	12
Table 7. Environmental effect of PES schemes	38
Table 8. Preliminary economic impact of PES schemes	39
Table 9. Annual transaction costs and related costs in implementing the PES schemes	42
Table 10. Legal feasibility of PES schemes	45
Table 11. Financial resources of PES schemes	48
Table 12. SWOT matrix of PES implementation in Southeast Asia	49

LIST OF FIGURES

Figure 1. Map of Southeast Asia	5
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PAYMENT FOR ENVIRONMENTAL SERVICES IN SOUTHEAST ASIA: A REGIONAL REVIEW OF POLICY IMPLEMENTATION

Nguyen Thi Y Ly
Pham Thanh Nam

EXECUTIVE SUMMARY

Payment for environmental services (PES) is a promising new concept in most Southeast Asian (SEA) countries and is seen as an effective tool to replace the command and control approach to natural resource and environmental management. This paper is a compilation of 12 cases from four countries where PES has been applied, namely: Cambodia, Indonesia, the Philippines, and Vietnam. The information on these case studies was obtained by collating all available documents from the internet, scientific websites, and research organizations, and cross-referencing the information from them with findings from site visits, using a consistent checklist. This information was then used to evaluate, compare, and analyze the case studies in order to assess the successes and failures of the PES mechanism in SEA.

The results indicate that, although not all of the PES implementation projects in the region have complied with the five criteria clarified by Wunder (2005), they have had positive economic and environmental impacts. Most importantly they have significantly improved stakeholders' awareness of the value of natural resources and environmental services. A SWOT analysis reveals that the studied PES projects have several strengths and that opportunities exist to develop and expand the application of PES in SEA to prevent the degradation of natural resources and the environment. However, the study also shows that to implement PES more efficiently in the region, steps need to be taken to secure land tenure and to establish a clear framework for the sustainable application of the PES approach. Such a framework should address issues such as service evaluation, legal support, finance, and social capacity.

1.0 INTRODUCTION

1.1 Problem Statement

PES is a voluntary transaction for a well-defined environmental service. This service is purchased by at least one environmental service buyer from at least one environmental service provider. It is done if, and only if, the environmental service provider meets the conditions of the PES contract and secures the provision of the environmental service in question (UN 2009). In 1996, the first formally labeled PES program was implemented in Costa Rica. The approach then expanded to the USA, Mexico, Ecuador and many other countries. PES has now been documented in more than 280 regions/countries globally.

In SEA, PES has been implemented in some countries at both the regional and national level. For example, since the 1990s, PES has been used as a policy instrument to manage the watershed in Indonesia's Cidanau river, where land use changes have caused sedimentation to affect water quality. In this instance, the local water supply company has paid upstream farmers to maintain the environmental services of the river's watershed.

In Cambodia, the Seima Biodiversity Conservation Area project has paid locals to conserve bird nests to address increasing threats to endangered species. This initiative has been in place since 2002. Participants are paid for labor and for the number of nests they protect.

At a national level, Vietnam is the first SEA country to launch a national policy on Payment for Forest Environment Services (PFES). This was done at the end of 2008 and was piloted in Lam Dong and Son La provinces from 2008 to 2010.

Regionally, the World Agroforestry Centre (ICRAF) has initiated a PES program that aims to reward poor upland farmers for providing environmental services to society. The program, called “Rewarding the Upland Poor for Environmental Services” (RUPES), is being implemented in Indonesia, the Philippines, and other countries (Padilla *et al.* 2005). RUPES has developed payment mechanisms to compensate upland service providers for watershed protection, carbon sequestration, biodiversity conservation, and landscape beauty.

However, in this initial period of PES implementation in SEA, the fortune of PES projects has been mixed; some regions and countries have been successful at applying the PES approach, while others have failed. For example, while the PFES implementation in Vietnam used the same mechanism in Lam Dong and in Son La, the project in the former was evaluated as a success while the one in the latter was faced with several difficulties relating to various undesirable external and internal factors.

In light of this state of affairs, case studies relating to PES implementation in SEA have been drawn up. However, up till now, no review of PES implementation in SEA has been done to determine why some PES projects have succeeded while others have failed.

PES is considered as an appropriate tool to deliver sustainable natural resource management as well as to improve local livelihood. Experiences gained from PES case studies will therefore be very useful for new PES implementation in the region. Therefore, this paper focuses on assessing PES implementation in SEA countries to determine the factors behind their success or failure, to understand issues in or objections to PES application, and to augment what is already known from past research.

1.2 Research Questions

1. What are the contextual factors affecting the design and development of PES programs in SEA countries?
2. Under what conditions and how have PES programs been implemented in different countries in SEA?
3. What are the main factors behind the success and failure of PES projects in each country and how can these results be generalized to other countries in SEA?
4. How could the PES mechanism in each case study be improved?
5. What lessons can the experiences of SEA contribute to the world debate on PES implementation?

1.3 Research Objectives

This document is a selection of case studies from across SEA where PES has been implemented at a local, national or regional level. The overall objective behind it is to determine the factors behind their success or failure. Specially, this compilation will focus on PES case studies from the Philippines, Indonesia, Cambodia, and Vietnam where PES has been implemented practically as an environmental management policy. Hence, it focuses on:

1. Bringing together the different PES mechanisms from across the region and determining the contextual factors that influence their design and development.
2. Analyzing the context and implementation procedure of the PES approach through case studies from SEA countries.
3. Capitalizing on the lessons learned exhibited in each PES project (particularly in terms of success and failure factors) to determine what could be improved in each implementation case.
4. Determining what constitutes the best practice and strategy for implementing PES in the SEA context.
5. Contributing to the regional and global debate about the PES mechanism.

1.4 Research Scope

1. Regarding geographical reach, the research will concentrate on case studies that have been carried out in the Philippines, Indonesia, Cambodia, and Vietnam where PES has already been implemented.
2. Regarding project duration, the research only focuses on PES projects that have been on-going for a long enough period that it is possible to assess their impact on ecosystems, the flow of ecosystem services, and the income of service providers.
3. Regarding content, the research will focus on:
 - a) Collecting and reviewing related information and case studies on PES implementation in the Philippines, Indonesia, Cambodia, and Vietnam.
 - b) Summarize the main aspects of each case study to characterize the PES mechanism in SEA.
 - c) Identify the contextual factors influencing the design and development of PES programs in SEA countries.
 - d) Analyze and assess the factors contributing to the success or failure of PES implementation in each case study, country, and region.
 - e) Propose an appropriate implementation framework for PES programs, based on the reviewed experiences of SEA countries.

2.0 RESEARCH METHODS

To gather the necessary information for this research, PES case studies from various different sources were collected. These sources included the internet, printed documents, and regional NGOs involved in PES implementation such as ICRAF in SEA, the Greater Mekong Subregion Environment Operations Center, Winrock International, and the Asia Regional Biodiversity Conservation Program. In addition, the researchers contacted colleagues from the Economy and Environment Program's (EEPSEA) research network in the Philippines, Indonesia, Cambodia, and Vietnam to collect information.

The information gathered was then collated to highlight gaps and to draw up a list of any further information requirements. Key informers for each case study were then contacted to collect all the remaining required information. Visits were made to at least two PES sites in each country to undertake direct observations, interview key people, talk with local residents, and meet key informers. This was done to allow further analysis of each PES case study.

Based on additional information gathered, the first draft of the report was revised and a second draft drawn up and sent by e-mail to key informers for their comments. The final report was revised based on their comments.

The context and background of each PES project case study was presented. Each case study described the PES project's implementation, governance structure, and any related land tenure issues. The relationship between relevant land use patterns and environmental services was identified, and details were given about how aware local residents were of its existence. Each case study also contains a justification of its relevance and its results, lessons (especially key challenges and success and failure factors), and recommendations are outlined.

2.1 Review of PES Case Studies

Initially, the project clearly identified the PES context of each case study. This review was done using a general checklist for all case studies (see Appendix 1). Through this checklist, the general context of each PES case study was explained in terms of its location features, the potential of the PES project, its purpose and drivers, and the financial resources available. These case studies show a shift from the predominant use

of command and control mechanisms to the use of more flexible, financially sustainable and efficient market-based approach (Rowcroft 2005). Through this review, the project also clarified whether the environmental management policy for each case study was PES-based or not.

2.2 PES Preparation and Implementation

To develop a clear picture of each PES case study, their quantitative and qualitative indicators were identified using a checklist (see Appendix 2). Using this, the two main phases of each PES project (preparation and implementation) were analyzed. The analysis of the preparation phase focused on all activities relating to stakeholder identification, environmental services paid, the methods used to identify payment levels, the types of payment or rewards offered, contract design, fee structures, and transaction costs. The analysis of the implementation phase focused on PES organization and management, on the processes used to advance the project and monitor its success, and on issues of scale.

2.3 PES Evaluation

In this step, an assessment of PES implementation was carried out using the quantitative and qualitative criteria presented in Appendix 3. In general, the evaluation of the case studies focused on the achievement of proposed objectives, the appropriation of payment mechanisms, and on project efficiency, equity, legal feasibility and financial feasibility.

In addition, each PES case study was evaluated in detail by using the variables relating to sustainable livelihood issues (including human, social, financial, physical, and natural capital). These variables, listed and discussed below, were used to determine the success and failure of each PES project.

1. **Creation of working days and contribution to income, improvements to agricultural productivity and knowledge on environmental preservation:** used to indicate whether each PES project helped increase local service suppliers' income, employment and production; the higher the income contribution each project made, the more successful they were considered to be.
2. **Poverty alleviation:** used to indicate how each PES project contributed to local poverty alleviation.
3. **Well-being and capabilities:** used to indicate how each PES project contributed to self-esteem, security, vulnerability, power and exclusion for participants.
4. **Livelihood adaptation:** used to indicate how each PES project affected the vulnerability and resilience of local communities.
5. **Services supplied:** used to indicate how each PES project affected the quality and quantity of services supplied by participants.
6. **Human capital:** used to indicate how each PES project affected in-kind payments, such as training on service protection and conservation, training on agriculture skills, and general education.
7. **Participant attraction:** used to gauge whether PES participation was increasing, decreasing, or unchanging.
8. **Monitoring performance:** used to gauge the effectiveness of PES project monitoring (vital for the evaluation of PES implementation progress and its impact).
9. **Transaction cost/total benefit:** used to gauge the cost-effectiveness of each PES project; the lower a project's transaction cost, the higher its efficiency.
10. **Local or national legal framework for sustainable PES implementation:** used to gauge the suitability of the legal framework supporting each PES project. This is vital as weak governance and a lack of clearly defined property rights are threats to the success of any such system and are important constraints to the application of PES (Rowcroft 2005). Additionally, a strong legal framework is needed to define the responsibilities of suppliers and users. Where such frameworks are not fit for the purpose, the design and implementation of a PES system may require changes to the legislative and regulatory framework.

11. **Potential buyers of PES:** used to gauge the level of interest in adopting the PES approach. Normally, buyers are local or national, public or private service users such as hydropower companies, water supply companies, and ecotourism companies. There can be single and multiple buyers.

It should be noted that the level of awareness of the PES concept across Asia is relatively low as the concept is still relatively new; many potential buyers are therefore still not aware (Huang and Upadhyaya 2007). Hence, the more visible the evidence of a connection between resource protection and its role in supplying environmental services, the easier it is to convince service users to pay. This variable was also used to gauge the potential for the sustainable expansion and development of the next stages of PES.

Finally, following the checklists described above, a SWOT matrix was used to analyze the strengths, weaknesses, opportunities and threats facing PES implementation in each case study (and in each country). The SWOT matrix was then analyzed to provide suggestions for improvements in each case study.

3.0 FEATURES OF SOUTHEAST ASIAN COUNTRIES

3.1 Land Area and Population

SEA consists of two distinctive geographic regions: mainland SEA and maritime SEA. Mainland SEA (also known as Indochina) is comprised of Cambodia, Laos, Myanmar, Thailand, Vietnam and peninsular Malaysia. Maritime SEA, which is analogous to the Malay Archipelago, is comprised of Brunei, East Malaysia, Indonesia, Papua New Guinea, the Philippines, and Singapore.

The total land area of the SEA region is 4.78 million km², which accounts for approximately 36.76% of the world's total area. Of this, Indonesia is the largest country (with a total land area of 1.8 million km²) and Singapore the smallest (total land area of 700 km²).

SEA is recognized as an area of high population and some countries in the region are ranked amongst the world's highest in terms of population density. For example, the average population per square kilometer in Singapore, the Philippines, Vietnam, and Indonesia is 7,251, 313, 280, and 132, respectively. The total population of the whole area is 598.23 million and the average population density is 770/km².



Figure 1. Map of Southeast Asia
Source: Google Earth 2011

3.2 Economic Development and Environment Issues

SEA is a vast, tropical and economic sub-region of Asia. For the last few years, SEA countries have achieved remarkable economic growth rate. However, although the average rate of economic development in the region was relative high compared to that of other countries around the world, there have been significant differences between the GDP growth rates of different countries (Table 1). For instance, in 2010, the average regional GDP growth rate was 7.13%. During this year, Singapore, the “Asian dragon”, grew at the highest rate (14.5% per year), while the growth rate of Brunei was negative. The average GDP per capita in the region was USD 8,391 (Cambodia had the lowest GDP per capita and Singapore the highest).

Table 1. General characteristics of countries in Southeast Asia

Countries	Land area (km ²)	Population in total	Population density (people/km ²)	GDP/capita (current USD)	GDP growth (annual %)	Forest area (km ²)	Forest area (% of land area)
Brunei	5,270	398,920	76	27,390	-1.8	3,800	72.1
Cambodia	176,520	14,138,255	80	802	6.7	100,940	57.2
Indonesia	1,811,570	239,870,937	132	2,946	6.1	944,320	52.1
Laos	230,800	6,200,894	27	1,208	8.4	157,510	68.2
Malaysia	328,550	28,401,017	86	8,373	7.2	204,560	62.3
Myanmar	653,520	47,963,012	73			317,730	48.6
Papua New Guinea	452,860	6,858,266	15	1,382	8	287,260	63.4
Philippines	298,170	93,260,798	313	2,140	7.6	76,650	25.7
Singapore	700	5,076,700	7,252	43,867	14.5	20	2.9
Thailand	510,890	69,122,234	135	4,613	7.8	189,720	37.1
Vietnam	310,070	86,936,464	280	1,191	6.8	137,970	44.5

Source: World Bank 2011

SEA countries have developed rapidly and have therefore enjoyed higher living standards than ever before. However, as in other parts of the world, this growth has led to environmental and natural resource degradation. To date, SEA countries have faced several common environmental problems including soil deterioration, deforestation, climate change, water pollution, air pollution and urban and industrial waste. Regionally, land resources are limited, and high population densities put considerable pressure on land use. Consequently, there has been widespread conversion of forestland to agricultural use. Deforestation and uncontrolled cultivation have not only destroyed the forest resource in many areas, but have also created many other environmental problems, such as soil erosion and soil deterioration. What's more, due to the impact of climate change, surface and ground water resources have been reduced. In addition, the expansion of industrial zones and industrial agriculture has left huge amounts of sewage and chemical waste in the environment. Hence, many water resources have been contaminated and are now unusable.

The total forest area of SEA countries has diminished significantly over recent year (Table 2). For instance, between 1990 and 2010, the region's forest area reduced by 8.63% (equivalent to a loss of approximately 147,673 km²). Deforestation occurred in most countries in the region, although Cambodia and Indonesia were particularly badly affected. The total forest area declined by more 20% in both countries comparing to that in 1990, with Cambodia losing 22.02% and Indonesia 20.34%. These high deforestation rates were mainly caused by illegal logging, by the conversion of forest to agricultural land, and by forest fires. However, it should be noted that the total forest area increased in some countries (i.e., Vietnam and the Philippines). This increase can be explained by afforestation and by the natural expansion of forests.

Table 2. Forest area in Southeast Asian countries

Country	Area (km ²)				Period change	Period change rate (%)
	1990	2000	2005	2010	1990 - 2010	1990 - 2010
Brunei	4,130	3,970	3,890	3,800	-330	-7.99
Cambodia	129,440	115,460	107,310	100,940	-28,500	-22.02
Indonesia	118,545	994,090	97,857	94,432	-24,113	-20.34
Laos	173,140	165,320	161,420	157,510	-15,630	-9.03
Malaysia	223,760	215,910	208,900	204,560	-19,200	-8.58
Myanmar	392,180	348,680	333,210	317,730	-74,450	-18.98
Papua New Guinea	315,230	301,330	294,370	287,260	-27,970	-8.87
Philippines	65,700	71,170	73,910	76,650	10,950	16.67
Singapore	20	20	20	20	0	0.00
Thailand	195,490	190,040	188,980	189,720	-5,770	-2.95
Viet Nam	93,630	117,250	130,770	130,970	37,340	39.88
Southeast Asia	1,711,265	2,523,240	1,600,637	1,563,592	-147,673	-8.63

Source: World Bank 2011

3.3 Land Ownership

Land tenure affects the efficiency of land-use decision-making. If individual land ownership rights are not secure under emerging individualized tenure, then there is the possibility that those who undertake long-term investments may not be able to reap any potential future benefits. This might be due to an inability to bequeath their property to their desired heirs or because they can't sell their land freely. In this way, efficient farm management can be hampered by tenure insecurity (Besley 1995).

In most SEA countries, forestland (and land in general) is predominantly state-owned. Because of this, individuals and local communities usually have weak land rights. For instance, in Cambodia, forest is under public ownership, as all regulated forestland belongs to the state. Community forestry is one category of permanent forest reserve. In such reserves the state recognizes and ensures traditional use right for the purpose of traditional customs, beliefs, religions and livelihoods (FAO 2011). On the other hand, in Indonesia, public ownership and private ownership of land take place alongside each other. In particular, all forestland is owned by the government, but management rights can be given to local communities, private corporations, and institutions. In 2010, private forest ownership accounted for around 10% of Indonesia's total forest area. In the Philippines, public ownership encompasses forest in legally classified forestland and private ownership encompasses forest in legally classified alienable or disposable (A&D) lands; privately owned forest accounts for approximately 15% of the total forest area in the country. In Vietnam, land belongs to the government. However, some areas are allocated to different organizations or households for forest management and development for a limited period.

4.0 REVIEW OF CASE STUDIES ON PES IN SOUTHEAST ASIAN COUNTRIES

Although the PES concept is still in its infancy, most countries in SEA are showing increasing interest in this conservation mechanism. PES is an alternative to the command and control (CAC) approach that has conventionally been applied to environmental and natural resource management in SEA. So far, a number of PES projects have been implemented, or are in progress, at the regional and local level. However, this has been done without the development of a permanent strategy to expand and sustain a PES program at national and global levels. In addition, most current schemes in this area are only "PES-like", and do not meet all the criteria of 'real PES' schemes as defined by Wunder (2005) and Wertz-Kanounnikoff *S. et al.* (2011). As a result, some PES schemes have been evaluated as effective, while others have been classed as failures.

This paper reviews 12 PES and "PES-like" case studies from four countries, namely: Cambodia (Table 3), Indonesia (Table 4), the Philippines (Table 5), and Vietnam (Table 6). It assesses what lessons and

recommendations can be drawn from each case study with respect to PES best practice in SEA. This is done with reference to the PES criteria developed by Wunder (2005), which state that a PES should be (a) a voluntary transaction in which (b) a well-defined environmental service (ES) or a land use likely to secure that service (c) is being purchased by at least one ES buyer (d) from at least one ES provider (e) if, and only if, the ES provider ensures the supply of the ES (conditionality).

The case studies that are assessed in this paper are mainly based on RUPES projects. RUPES is an initiative that is dedicated to developing practical environmental services schemes that could be adapted to work in different countries under different circumstances. RUPES was established in 2001 to look at the potential of the PES mechanism in Asia, with particular emphasis on its potential benefits for the upland poor. RUPES is led by ICRAF's regional office in Indonesia. It has major funding from the International Fund for Agricultural Development (IFAD). Its goal is to integrate rewards for environmental services into development programs so as to alleviate rural poverty and protect the natural environment. RUPES has supported the implementation of PES in several countries in Asia, including China, Indonesia, the Philippines, and Vietnam.

Table 3. Payment for environmental services case studies in Cambodia

Program name	Status	Description	Services	Sellers/buyers	Payment	Resource
Agreement for Forest, Wildlife, and Crocodile Habitat Protection in Chumnoab	Started in 2006	A project by Conservation International that sought to prevent further destruction of the protected area in Chumnoab. An agreement was reached with the community to protect a 20,000 ha area in which deforestation and hunting were banned. Patrols were set up to enforce the protection.	Full ecosystem services	<i>Sellers:</i> Chumnoab community <i>Buyers:</i> Conservation International	Cash and in-kind payments	Som <i>et al.</i> 2006
Wildlife Conservation Society Biodiversity Payment	4 villages in 2002, 21 villages in 2008	Cambodia lies within the Indo-Burma hotspot and contains four of the Global 200 Ecological regions. Since 2002, the bird nest program has been extremely successful at protecting nesting sites, safeguarding over 1,550 nests of globally threatened or near-threatened species.	Bird and bird nest protection	<i>Sellers:</i> local people, who have de facto control of nest sites <i>Buyers:</i> Wildlife Conservation Society	Cash	TransLinks 2009
Oddar Meanchey REDD Project	Started in 2008 (crediting period: 30 years)	The first Cambodian “avoided deforestation” project involves 13 Community Forestry Groups, comprised of 58 villages, which protect 67,853 ha of forestland in the Northwestern province of Oddar Meanchey. The project is submitted under the Voluntary Carbon Standard combined with the Climate, Community & Biodiversity Alliance Standards. It is expected to sequester 7.1 million tonnes of CO ₂ over 30 years.	Carbon sequestration	<i>Sellers:</i> communities, households <i>Buyers:</i> voluntary over-the-counter market	Cash and in-kind payments	Pact-Cambodia ¹ 2009

¹ PACT is a US-based organization that enables systemic solutions that allow those who are poor and marginalized to earn a dignified living, be healthy, and take part in the benefits that nature provides. PACT accomplishes this by strengthening local capacity, forging effective governance systems, and transforming markets into a force for development. This organization opened its office in Cambodia in 1991.

Table 4. Payment for environmental services case studies in Indonesia

Program name	Status	Description	Services	Sellers/buyers	Payment	Resource
RUPES - Singkarak Watershed, West Sumatra Province	Started in 2005	A proposal to deal with current environment degradation in Singkarak was developed through collaboration between RUPES and the local government. Following this proposal, project beneficiaries must pay farmers around the watershed to carry out reforestation and rehabilitation work through agroforestry.	Water quality and quantity, flood and landslide control, and carbon sequestration	<i>Sellers:</i> local farmers around the lake <i>Buyers:</i> local governments and a Dutch Company	Cash and in-kind (land tenure)	IFAD 2011
Way Besai Watershed, Sumber Jaya, Lampung Province	Ongoing since 2004	Set up with the aim of transferring the management of cultivated state-owned protected forests to the communities. This was done using multi-strata coffee gardens to improve watershed protection benefits. RUPES developed a reward mechanism for the environmental services provided by upland communities.	Water flow regulation, water quality, and erosion control (sedimentation)	<i>Sellers:</i> upstream farmers <i>Buyers:</i> State Forestry Department and State Hydroelectric Power Company	In-kind (land tenure)	IIED 2006
Cidanau Watershed, Benten Province	2004	Cidanau Watershed is a water regulation and supply source. In the 2000s, the quality and quantity of its water was degraded. In 2004, a water supply company (PT.KTI) helped, and paid, upstream famers to carry out watershed rehabilitation work and to apply conservation farming techniques to improve the quality of environmental services.	Water regulation and ecosystem conservation	<i>Sellers:</i> upstream farmers <i>Buyers:</i> PT Krakatau Tirta Industri (PT.KTI)	Cash and in-kind (conservation skills)	Budhi <i>et al.</i> 2008

Table 5. Payment for environmental services case studies in the Philippines

Program name	Status	Description	Services	Sellers/buyers	Payment	Resource
PES in Maasin Watershed, Iloilo Province	1998 - 2003	Loss of forest cover in the Maasin watershed resulted in a reduction of water flow. The governor of Iloilo responded by making the rehabilitation of the Maasin watershed a top priority for the province. The government collected a fund from Metro Iloilo Water District company (and other donations). This was spent on watershed rehabilitation, reforestation and application of agroforestry farming techniques.	Water flow regulation	<i>Sellers:</i> groups of upstream farmers <i>Buyer:</i> Metro Iloilo Water District company	In-kind payment (labor cost of reforestation, rehabilitation, and 'best farming management' technical assistance)	Buric and Gault 2011; Padilla <i>et al.</i> 2005
Mt. Kanla-on Spring Water Plant	Ongoing, since 1999	Mt. Kanla-on Natural Park contributes to the quality and quantity of water used by the Kanla-on Spring Water Plant. However, the forest around the park has been degraded by encroachment and illegal logging. The Plant has supported local famers to reforest the area and apply sustainable agroforestry farming techniques.	Water quality protection, soil reservation, and biodiversity conservation	<i>Sellers:</i> upstream farmers <i>Buyer:</i> Kanla-on Spring Water Plant	In-kind (labor payment, technical assistance, social and infrastructure facilities)	Francisco 2003; Buric and Gault 2011; Padilla <i>et al.</i> 2005
Watershed Rehabilitation Funds	Ongoing, since 1995	The Philippine government asked hydroelectricity producers to assign PhP 0.01 for every KWh they generated to a fund to improve the environment and livelihood of farmers in their host communities.	Water flow regulation and sedimentation reduction	<i>Sellers:</i> upstream communities <i>Buyers:</i> local hydroelectricity companies	In-kind (labor payment, infrastructure, public facilities)	Rosales 2003; Buric and Gault 2011

Table 6. Payment for environmental services case studies in Vietnam

Program name	Status	Description	Services	Sellers/buyers	Payment	Resource
PFES in Upland Central Vietnam	Since 2003	The study looked at whether Vietnam could adopt the PES approach as part of its national conservation strategy. Through an experimental study in the country's uplands, it investigated how such a scheme might run and assessed its impact on the environment and on the local people's livelihoods. Through a review of current Vietnamese conservation practice, it assessed the barriers to the adoption of such schemes and the factors that might encourage their implementation.	Watershed service	<i>Sellers:</i> local farmers <i>Buyers:</i> Economy and Environment Program for Southeast Asia (EEPSEA)	Cash payment	Bui <i>et al.</i> 2004
PFES in Lam Dong Province	Since 2006	With assistance from USAID Regional Development Mission for Asia, Winrock International's Asia Regional Biodiversity Conservation Program has (since 2006) helped the Vietnamese government to implement a successful PFES pilot program. This has improved the livelihood of over 40,000 rural poor while promoting biodiversity conservation in Lam Dong Province and across the country.	Water regulation, soil conservation, and tourism landscape	<i>Sellers:</i> forest owners <i>Buyers:</i> hydropower companies, Water supply companies, tourism businesses	Cash and in-kind (on watershed basis)	WI 2010 ²
REDD in Da Nhim Watershed	Since 2007	The Da Nhim Avoided Deforestation and Forest Degradation (REDD) project was initiated in May 2007. It focuses on the Vietnamese central highland province of Lam Dong – a component of Asia Regional Biodiversity Conservation Program. The project started with collaborative field work and capacity building workshops that involved the Vietnamese government, Lam Dong provincial personnel, and Winrock International forestry staff.	Carbon sequestration	<i>Sellers:</i> forest owners <i>Buyers:</i> voluntary carbon market	Cash, payment level depends on carbon revenues	ARBCP 2011

² The source of this case was supplied by Winrock International-Vietnam via personal communication, workshop participation, and expert interview.

4.1 Cambodia

In the past, the management of forest resources in Cambodia was based on regulatory approaches that focused on protected areas and relied on CAC instruments such as the Law on Environmental Protection and Natural Resources Management. However, in recent years, the notion of environmental services has been more visible in the country, particularly through the development of some PES schemes and the explicit integration of this market-based instrument into some government strategies. The government has started considering the direct use value of ecosystems, and also the indirect and non-use values associated with carbon storage, watershed protection, biodiversity, and so on. This has been done with the technical and financial support of international programs and agencies such as the United Nations Environment Programme (UNEP)/Global Environment Facility (GEF), the Center for International Forestry Research (CIFOR), and the Danish International Development Agency (DANIDA).

4.1.1 CASE 1: Agreement for Forest, Wildlife, and Crocodile Habitat Protection in Chumnoab

- a) **Location:** Chumnoab Commune, Thmar Bang District, Koh Kong Province, Cambodia
- b) **Driver:** The Chumnoab community consists of 73 families who live in the 400,000-hectare Cardamoms protected forest of Cambodia. These families were destroying some 40 ha of “protected” forest annually through swidden farming. They were also hunting rare wild animals. Their basic challenge – and that which drives their environmentally destructive behavior – was their lack of economic opportunities.
- c) **Stakeholders:** Chumnoab community and Conservation International (CI) – Cambodia.
- d) **Facilitator:** This was a project overseen by CI.
- e) **Service identification:** CI sought to prevent further destruction of the protected area and to help the community to satisfy its needs. These were identified through the project as: food security through rice production, teachers who would remain at the school, and income-earning opportunities.
- f) **Tasks of service providers:** These tasks were defined as protecting the forest, the wildlife, and the crocodile habitat. Specifically, an agreement was reached with the community to demarcate and protect a 20,000-hectare forest area, in which deforestation and hunting would be banned so that the full ecosystem services of the area could be restored. Patrols were set up to enforce this protection. Since the agreement was signed, the local community has done the following:
 - i. Maintained and protected the forest, the crocodile habitat, and the species of the Chumnoab commune by following the provisions of the draft Participatory Land Use Plan (PLUP) map zonings and the rules and regulations developed for the Chumnoab commune;
 - ii. Provided assistance to help combat illegal hunting and wildlife trade within the commune; and
 - iii. Stopped clearing forest areas for agriculture or other purposes.
- g) **Payment mechanism:** CI supports the community’s identified needs. The organization provides training in best agricultural practices as well as wages for conservation activities. It also provides buffaloes and agricultural tools. As a result, rice production has increased fourfold, teachers are paid to stay for full school years, and school attendance has improved. The agricultural training has enabled community members to diversify their sources of income.
- h) **Fund resource:** CI.
- i) **Terms of payment and payment duration:** CI provides cash payments to the Chumnoab commune to help its members protect the region’s forest, wildlife, and crocodile habitat. The amount given reflects the earnings that the local community forfeits by not cutting forests, killing wildlife, and damaging crocodile habitat. These funds are spent on the purchase of buffaloes that are distributed among the commune members. CI helps the commune with the purchase of the animals. In addition, the fund

supports local transport, wages for teachers at Chumnoad Public School, patrolling activities, and land use mapping. The total cost of the implementation of this agreement is USD 11,870 for a twelve-month period.

- j) **Monitoring:** In coordination with the local police, community rangers from the commune help ensure that land and resource use within the commune area comply with the provisions of the draft PLUP map, and the rules and regulations on the illegal trading and hunting of wild animals. Community rangers report any relevant illegal activities occurring to the Commune Natural Resource Management Committee (CNRMC). The CNRMC then informs the community officer or CI's law enforcement team (whichever is nearest). Community rangers dedicate 15 days/month during the project period to patrolling, removing snares, and observing wildlife hunting within the forest commune area.
- k) **Legal feasibility:** The Royal Government of Cambodia has established the following relevant wildlife regulations: Preah Reach Kret No. 1296-36 (1996); Article 5 & 6 of Bra Kas No. 1563, 1996; Declaration No. 3837; Decision on preparation and implementation of forestry administration (2003); Forestry concession management decree (2003); Protected Areas Law (2008). Cambodia has also signed an agreement with the international convention on biodiversity (1992), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and joined the RAMSAR Convention.
- l) **Costs and benefits:** Annual costs are USD 30,000. Benefits for the community include: increased rice production/food security, improved education, increased income and improved economic opportunities.
- m) **Constraints:** Finance is not sustainable since it is project-based.
- n) **Lessons learnt:**
 - The potential exists to scale the successful demonstration project up into a larger initiative.
 - Blue carbon can be stacked with other ecosystem services (such as biodiversity, storm protection, spawning grounds, etc.) in a single contract.
 - Sustainable economic activity can be linked with environmental agreements (fish stock recovery, development alternatives, etc.).
 - The approach can be tied into national/sub-national programs involving payment for ecosystem service.

4.1.2 CASE 2: Payments for Biodiversity Conservation in the Context of Weak Institutions

- a) **Location:** The project started in four pilot villages in 2002 in the Kulen Promtep Wildlife Sanctuary, Cambodia. It was extended to the Preah Vihear Protected Forest in 2004. By 2007 it was operating in over 15 villages.
- b) **Driver:** The large bird species found in the Northern Plains are badly threatened by human disturbance. One key problem is the collection of eggs and chicks, some of which can fetch more than USD 100 in national and international wildlife markets. Collection is mostly done by local communities, who sell the eggs and chicks to middlemen.
- c) **Stakeholders:** Individuals are responsible for nest protection and Wildlife Conservation Society (WCS) is in charge of monitoring and making payments.
- d) **Facilitator:** The Bird Nest Protection program was started in 2002 to locate, monitor and protect the remaining nesting sites of the 10 rarest bird species in the region.
- e) **Service identification:** WCS.

- f) **Tasks of service providers:** Under the program, locals are offered a reward of up to USD 5 for reporting nests. They are then employed to monitor and protect the birds until the chicks successfully fledge.
- g) **Payment mechanism:** Unlike the previous case study, the bird nest protection program works entirely through individual contracts; it is not community-based. Average payments per family are around USD 100/year, although there is considerable variation in these payments, depending on how long people are employed.

Some individuals have become specialist protectors. They switch the species they monitor depending on the season and can receive continual employment over several months. The amounts paid can total more than USD 400/individual. This is substantial in comparison with the other cash income options available to locals.

Payments per village average USD 1,100 to USD 1,500, depending on the year, but some villages earn considerably more due to the presence of a large number of key species in their vicinity, or due to the presence of species with particularly long breeding periods. Antil village has made the largest amount (nearly USD 11,000 over three seasons). This was mainly due to the presence of Greater Adjutant colonies nearby. These birds require at least six months of protection each year.

- h) **Fund resource:** WCS.
- i) **Terms of payment and payment duration:** Initially, protectors received USD 1/day for their work and a bonus of USD 1/day worked, upon completion, if the chicks they were looking after were successfully fledged. This total payment of USD 2/day was judged an acceptable daily wage based on initial village consultations. From 2008 onwards, this was increased to USD 2.50/day (USD 1.25/day up front and an extra USD 1.25/day if fledging is successful) due to rising food prices. If it is verified that nests have failed due to natural causes (such as predation), then full payments are still made.
- j) **Monitoring:** The protection teams are visited every 1-2 weeks by village rangers employed by WCS and also by WCS monitoring staff. This is done to check on the status of the nests and for research and data collection.
- k) **Legal feasibility:** Property rights of nests act as a de facto individual control.
- l) **Costs and benefits:** The simplified institutional arrangements of the bird nest program lead to low administrative costs and 71-78% of payments are disbursed at the local level. Average incomes are USD 1,200/village (maximum USD 4,000) and USD 120/participant per year.

Low administrative costs were predicted by Ferraro and Kiss (2002), who suggested that direct payment programs would have administrative costs of only 5-25%, which is far lower than indirect conservation interventions. The bird nest program was also inexpensive to establish and initial investment costs were low. However, only 5% of potential participant families have been employed by the program and it does not incorporate mechanisms for wider benefit sharing. This shows that the approach can only benefit a relatively small number of people.

A study in Madagascar found that the majority of participants perceived a village-managed program to be a fairer approach, despite apparent inequalities, and ranked its communal benefits highly (Sommerville *et al.* 2009). Direct payment programs for biodiversity conservation have also been criticized as being unsustainable because they rely on a continual stream of external funding (Swart 2003). This is the case with the bird nest program, as it is entirely dependent on the USD 25,000 to USD 30,000 made available annually by the WCS.

- m) **Constraints:** Designing PES programs in the context of weak institutions is challenging, particularly if property rights are not clearly defined. This is because direct payment systems require strong institutional frameworks that support the participants to follow the signed contract/agreement, particularly the enforcement of property rights (Börner *et al.* 2009; Muradian *et al.* 2010; Vatn 2010). The Cambodian bird nest protectors have weak ownership rights over breeding sites and have been unable to protect them from clearance by others in the longer term. In the absence of strong existing institutional frameworks, payment programs need to invest in building up appropriate institutions both

at the village and higher levels. Increasing the diversity of institutions creates checks and improves resilience and sustainability in the system (Berkes 2007); however, it also imposes its own costs.

- n) Lessons learnt:** Bird nests are valued only because WCS chooses to pay for their protection, not because of any particular recognition of the birds' importance; it is clear that if payments were stopped, even temporarily, the collection of bird nests would probably resume. Externally imposed rules and incentives may even 'crowd-out' locally developed rules and social norms (Bowles 2008; Cardenas *et al.* 2000; Vatn 2010), or lead to the perception that incentives are unfair (Fehr and Falk 2002), as may have occurred in the bird nest case. Payment programs that are structured to facilitate an intrinsic motivation to act in an environment-friendly way are therefore far more likely to be successful.

4.1.3 CASE 3: Oddar Meanchey REDD project

- a) Location:** The project involves 13 Community Forestry Groups, comprised of 58 villages, which protect 67,853 ha of forest land in Oddar Meanchey, a province is located in the northwestern corner of Cambodia.
- b) Driver:** Oddar Meanchey is an ideal site for developing a REDD (Reducing Emissions from Deforestation and Forest Degradation) project. The province's forests have been under intense pressure from commercial and illegal loggers, forest fire, economic land concessions, and encroachment. As a result, the province has lost 2.1% of its forests each year from 2002 to 2006.

A growing number of communities in the province have been protecting the remaining natural forests as Community Forest (Monk's Forest) areas. These protected areas include some of the largest community forests in the country. REDD project sites include large tracts of healthy closed-canopy forests, as well as degraded forests suitable for restoration.

- c) Stakeholders:** The project design team is comprised of a diverse group of actors, including community forestry specialists from non-profit organizations, government policymakers and foresters, donors, carbon brokers, remote sensing experts, carbon modelers, local NGOs, Buddhist monks, and forest dependent communities.
- d) Facilitator:** The project was facilitated by support to Community Forest International (CFI) from the John D. and Catherine T. MacArthur Foundation and Pact. The William J. Clinton Foundation also provided support under the Clinton Climate Change Initiative's Forestry Program.
- e) Service identification:** The Forestry Administration, together with CFI and other partners, has developed one of the world's first avoided deforestation projects in Oddar Meanchey (OM) Province. The project's goal is to generate, register and sell forest carbon credits. The project included the development of a new REDD mosaic deforestation methodology and a Project Document for a bundled community forestry project. These are currently subject to third party validation using the Voluntary Carbon Standard (VCS), and the Climate, Community & Biodiversity Alliance (CCB) Standards, respectively. The project is expected to sequester 7.1 million tonnes of CO₂ over 30 years.
- f) Tasks of service providers:** Mobilizing communities to protect forests. This is already proving to be effective in halting deforestation and degradation in community forestry (CF) areas. Key activities supported under the project include:
- Strengthening CF groups, including the formulation and adoption of management resolution mechanisms.
 - Networking with Forestry Administration field staff and neighboring villages.
 - Raising awareness of the REDD project and REDD activities.
 - Strengthening community forest tenure rights, through management agreements, mapping, and boundary demarcation.
 - Saving fuelwood through the introduction of improved cooking stoves.

- Controlling fire through fire line construction, fuel load reduction, and the use of fire brigades.
- Halting illegal logging through volunteer patrols and forest watchers.
- Building stronger coordination with commune, district, and provincial representatives.
- Creating financial incentives for successful forest protection.
- Developing annual carbon stock monitoring systems.
- Focusing on agricultural intensification.

g) Payment mechanism: A typical carbon sale is based on a forward purchase at a fixed price for five to twenty years. Payment is made upon the delivery of verified credits under the contracted standard, e.g., CDM (Clean Development Mechanism) or VCS. This approach is referred to as a spot purchase or payment-upon-delivery. This form of sale reduces the risk to the buyer and should ultimately lead to the highest price for the seller.

However, it does not provide the project with any cash flow until the first verification is complete. The only asset for many REDD projects is carbon, which cannot act as an effective collateral for pre-payment. As the market for pre-payment develops (especially for REDD projects that are developed for dual VCS and CCB registration), the project participants believe that there will be adequate demand for credits. They also believe that it will be possible to secure an attractive set of pre-payment terms for the Oddar Meanchey project.

Because the proponents of the project in Oddar Meanchey Province believed that publicizing and selling credits too early in the process could have an adverse effect of the price, a decision was made to start to market credits only after all agreements were completed and the VCS methodology and Project Document were well under way. Because the VCS validation process for the methodology took far longer than expected (due to the capacity constraints of the validating organization), the project is only now positioning itself to sell credits after the submission of the CCB Standards by the Protection Department in October 2009.

- h) Fund resource:** The project is funded by the Danish International Development Agency (DANIDA), by UK aid from the Department of International Development (DFID), by the New Zealand Agency for International Development (NZAID), and by the Clinton Climate Change Initiative's Forestry Program.
- i) Terms of payment and payment duration:** Cash support and land tenure rights for 30 years.
- j) Monitoring:** The project is implemented under the control of the Royal Government of Cambodia, which is represented by the national Forestry Administration.
- k) Legal feasibility:** In May 2008, the project was officially endorsed by Samdech Prime Minister Hun Sen through Sar Chor Nor No. 699. The project's guiding principles ensure that carbon revenues are used to: i) improve forest quality; ii) provide maximum benefits to the local communities that participate in the project's activities; and iii) identify new REDD projects in Cambodia.

The Sar Chor Nor No. 699 confirms the high-level commitment of the Royal Government of Cambodia to make the project a success and to use the revenue it produces effectively. The success of the Oddar Meanchey project will open the door for long-term financing of Cambodia's national community forestry program. This could eventually encompass and protect over two million hectares of forest, and would conform to the government's stated goals under the Rectangular Development Strategy.

- l) Costs and benefits:** The start-up costs, as well as most of the carbon development and some registration and validation costs, were supported by donor funds or by project partners who provided services in exchange for a share of the carbon. This enabled the project to be initiated and to begin its carbon development work. However, this did not provide adequate funding over the medium term to cover cash flow needs. As a result, other project funding options are being evaluated.

Four types of funding sources are under consideration: i) donor, ii) carbon sales with pre-payment, iii) equity, and iv) loans or debt issuance. Each of these comes with a unique set of opportunities and constraints, but it is clear that there is potential for combining funding sources, which should be helpful.

As estimated by Pact-Cambodia (2009), the total cost of implementing the project (for a period of 30 years) is USD 11,479,471 and the total revenue from selling the carbon credits will be USD 42.6 million. This amount is only linked to the revenue from selling carbon credits. However, the project also brings other benefits such as secure tenure and access to resources, employment generation, capacity building, training for farmers, and other social benefits.

- m) Constraints:** In developing a sub-national REDD project that is supportive of community needs, the project designers took into account a national context that included a recent history of deforestation. They also acknowledged the need for a legal and policy framework that would support a community-oriented forest initiative. Key challenges included the need to ensure sustainable management and equitable use of forests, to improve rural livelihoods, and to promote balanced socio-economic development in Cambodia. This was important as past forest management systems in the country had not contributed sufficiently to these broad policy objectives.

4.2 Indonesia

In Indonesia, the PES concept was initially established in 2002, through collaboration between the Institute for Social and Economic Research, Education and Information (LP3ES or Lembaga Penelitian Pengerangan dan Pendidikan Ekonomi dan Sosial) and the International Institute for Environment and Development (IIED). This was done through the Development for Transaction Mechanism of PES in the Watershed of Cidanau and Brantas and in West Lombok Regency. Among SEA countries, Indonesia currently has the largest number of PES initiatives.

4.2.1 CASE 1: Combining Environmental Service Markets for Carbon and Watershed Functions in Singkarak Watershed

- a) Location:** RUPES - Singkarak Watershed, West Sumatra Province, Indonesia.
- b) Driver:** Singkarak is an area that includes Lake Singkarak, which has a total area of 12,665 ha, and its surrounding catchment, which covers 129,000 ha (Arifin 2006). The area provides a complex system of lake, river, and other hydrological services, that provide water for domestic, commercial, and industrial use. Since the early of 2000s, approximately 31% of the catchment has been in a critical condition, as a result of non-suitable land use practices, degradation and infestation. The water quantity and quality of the water in Lake Singkarak have declined significantly as a result.

Since 2000, thanks to government reforms, the local community has become more aware of the importance of the forest cover around Lake Singkarak. In addition, in 2004, Indonesia passed Law 17/2004 to ratify the Kyoto Protocol (after more than four years of legislative process and heated public debate). Moreover, in 2003, RUPES' study results indicated that the conservation of protected forest, sustainable land-use management, and local agroforestry initiatives could generate significant carbon sequestration benefits. Consequently, in 2004, RUPES proposed to rehabilitate the slopes surrounding Singkarak Lake using agroforestry and reforestation, in order to improve the lake's water quantity and quality.

- c) Stakeholders:** The prime buyers of water services in the region are provincial and local governments. To buy the services, they use funds raised from a local water tax (Indonesian law requires state-owned companies to distribute royalties to both national and local government). Overall, 35% of total royalties is allocated by the provincial government.

Furthermore, since 2009, a Dutch company has paid significant amounts for carbon sequestration services. Service providers are local farmers in the Tanah Datar district, which surrounds

Singkarak Lake. The project's intermediary is the local government. In this case, government officers act as regulators, intermediaries, and also as buyers (Leimona *et al.* 2011).

d) Facilitator: ICRAF-SEA's RUPES through its program *Developing Mechanisms for Rewarding the Upland Poor in Asia for the Environmental Services They Provide* collaborated with the local government.

e) Service identification:

- i. Water quality for hydropower, native fish conservation and ecotourism;
- ii. Carbon sequestration for voluntary markets under the CDM; and
- iii. Sedimentation reduction.

f) Tasks of service providers:

- i. Implement Best Management Practices through agroforestry;
- ii. Revitalize organic coffee in the upstream watershed; and
- iii. Rehabilitate degraded ecosystems by replanting native trees in the state-owned protected forest.

All the tree species used in this project have to be native, instead of fast-growing species, and their use is supported by the government's Million-tree planting program. Participants are free to plant and cut trees, but must ensure that there are at least 1,000 standing trees per hectare.

g) Payment mechanism: An indirect payment mechanism is used in which the revenue paid by the hydroelectric companies as a tax for surface and subsurface water is passed on by the local government to the farmers who provide the specified environmental services. For instance, in 2005, the Nagari Paninggahan village received about USD 40,000 as a first allocation of hydropower royalties. The village then distributed this money to service providers.

In addition, a Dutch company has agreed to provide an investment fund of USD 28,500 to plant 28,000 trees on 28 ha of upstream land on the western part of the lake. This was done through the voluntary carbon market that has been in place since 2009. In early 2010, the company expanded the agreement to cover another 21 ha on the same hill. The addition of 40 more hectares is now being discussed (IFAD 2011). This payment was also allocated to service providers through the local government.

h) Fund resource:

- i. Local government uses funds raised from a local water tax paid by the state-owned hydropower company PLTA Singkarak; and
- ii. A Dutch company, CO₂ Operate BV (2009).

i) Terms of payment and payment duration: The amount paid for watershed services depends on the degree to which sediment load has been decreased and environment services improved over the duration of the five-year contract. Farmers, who have participated in the scheme as sellers of carbon since 2009, have been paid USD 1,000/ha to prepare land, buy seeds, and plant and maintain trees for a 10-year period. After this time, farmers will earn additional income based on the amount of carbon stocked in their trees (IFAD 2011).

j) Monitoring: A Joint Audit and local government evaluation is used to monitor the work of both service providers and sellers. This is done following negotiations based on field visits and satellite image analysis at the start of the project.

k) Legal feasibility: The fund is maintained using money obtained from a national surface and ground water tax. Additionally, the National Clean Development Mechanism has contributed significantly to carbon projects in Indonesia.

l) Costs and benefits: In general, the program has contributed to the alleviation of local poverty and has improved local governance and capacity. Participating farmers have grown crops in between the trees they have helped plant, and their incomes are improving alongside their food security (IFAD 2011). In addition, the rehabilitation and reforestation work that has taken place has begun to stabilize topsoil and has reduced erosion and sediment flow into the catchment, thereby benefiting downstream water users.

m) Constraints:

- Limited land ownership can limit local peoples' ability to contribute to environmental service provision.
- Low capacity (human resources and institutions) and complex, multi-layered local governance can make it difficult to implement such a development mechanism.
- It is difficult to maintain the interest of the hydropower company when there is little evidence to prove the relationship between payments and watershed service quality.
- The value of carbon sequestration mainly depends on the global community and the international market. Hence, the viability of maintaining such a PFES program for a long time in the future is brought into question because the concept is quite new, not only in Indonesia but also in other countries in SEA.
- This means that one of the challenges faced by the project is finding buyers for this service.

n) Lessons learnt

- Strong local institutions, national government backing, and a supportive legal framework are the key factors that encourage and facilitate PES work.
- This project is not a PES program per se, because there is no link between performance and payment.
- To take part in the environmental services market, a site should address not only environmental responsibility but also social responsibility. The Singkarak case fits the pro-poor approach and also provides scientific evidence of the management of a watershed. It therefore provides a good example of a tree-based, agroforestry approach to the provision of environmental services; one that highlights the importance of using carefully selected species that benefit local communities and comply with their preferences (Murdiyarso and Skutsch 2006).

4.2.2 CASE 2: Way Besai Watershed

a) Location: Way Besai Watershed, Sumber Jaya, Lampung Province, Indonesia.

b) Driver: In the 1990s, the region saw uncontrolled deforestation and the conversion of sloping land to coffee cultivation. This has led to a serious increase in erosion. In turn, this has had a negative impact on the operation of the newly constructed Way Besai hydropower dam, and has reduced water availability for irrigated paddy rice.

However, studies carried out in the area since 1998 by ICRAF, show that multi-strata coffee farms can not only provide livelihoods to farmers but can also control erosion in a way similar to natural forests. This shows that coffee farming and forest protection should not necessarily be viewed as antagonistic practices.

As a result, the Indonesian government, ICRAF and the local NGO Watala, the Ford Foundation, and the UK Government's DFID have been working towards developing a Negotiation Support System. The aim of this work is to combine a reconciliatory negotiation process with a toolbox that could clarify the likely consequences of potential land use changes. The Community Forestry Program was set up to allow farmers to obtain land tenure in return for protecting the remaining forest and planting trees on their coffee farms.

c) Stakeholders: Service suppliers are upstream farmers interested in accessing the state-owned production forest. Service users are the State Forest Department and hydroelectric power companies such as the government-owned Way Besai Plant. Intermediaries are the local NGOs, YACILI and Watala.

d) Facilitator: RUPES' involvement began in 2004 (IIED 2006). The group's researchers have developed guidelines to increase the benefits of the Hutan Kamasyarakatan (HKm) community forest program, both to local communities and to the environment.

- e) **Service identification:** Water flow regulation, erosion control, and water quality.
- f) **Tasks of service providers:**
- i. To implement Best Management Practices in coffee gardens by cultivating timber and fruit trees (i.e., by implementing agroforestry).
 - ii. To conserve and protect existing ecosystems (HKm members are under contract to protect the remaining natural forest).
- g) **Payment mechanism:** The Forest Department pays local individuals through farmers' groups. The payment mechanism is as follows: interested groups submit their proposals (relating to best management practices and the conservation and protection of existing ecosystems) to the Forest Department. After approval, a contract is written to establish the details of the agroforestry plots that must be maintained and the soil and water conservation practices that have to be applied.
- h) **Fund resource:** Government funds and payments by the Way Besai Hydropower Company.
- i) **Terms of payment and payment duration:** In-kind payments such as the legal permission to use state-owned protected forest for a trial period of five years (with the possibility of this period being extended to 25 years). Another example of in-kind payments was the provision of a micro hydroelectric power plant with a capacity of 5,000 W (in Buluh Kapur), if the community could reduce sediment levels by 30% or more. Cash payments have also been made (USD 2,222 in Gunung Sari).
- j) **Monitoring:** Every three months, the scheme is monitored by an external stakeholder (the local Forestry Service). Two main aspects are considered: conservation and hydrology. The scheme's conservation impacts are monitored because participants agree to protect the remaining forest. Its hydrological impacts are monitored and a Water Forum has been established to facilitate communication between the scheme's various stakeholders (i.e., farmer communities, government agencies, and NGOs).
- Six initial community "water watch" groups have been established in Sumber Jaya and have conducted action-learning to find out how to measure the quality of their water resources. Guidelines to conduct this water quality monitoring have been produced. These outline simple methods to measure the physical, chemical and biological aspects of water quality. Through this activity, RUPES expects the community to become more aware of water quality and its relationship to issues such as watershed management and human health.
- k) **Legal feasibility:** HKm regulations have been issued.

l) **Costs and benefits**

Economic

- **Opportunity cost:** Due to the drop in coffee prices after 2002, the profitability of coffee-based systems has fallen. This means that returns from intensive coffee crop management have been relatively low. This has made multi-strata coffee gardens a more attractive option. (van Noordwijk and Haines 2005).
- **Transaction costs:** Arifin (2006) estimates the costs of establishing and managing an HKm group to be about IDR 504,000/household (or about USD 55/household). Considering that the average annual income of a farm household in Sumber Jaya is about IDR 1 million (or USD 110), households must be able to invest half of their annual income to access the HKm program. (Calculations were based on the time spent on the necessary activities, at average local wage rates.)

Environmental

- **Erosion:** According to Verbist *et al.* (2006) and van Noordwijk and Haines (2005), erosion rates in multi-strata coffee gardens initially lie between those of bare soil and forest, depending on soil cover, but they gradually decrease as the surface litter layer establishes soil cover.

- **Water flows:** Verbist *et al.* (2006) argues that the recorded decrease in dry season flows in the Way Besai river over the past decade reflects the influence of El Niño events rather than the effects of local land use changes.
- **HKm as a perverse incentive for further forest encroachment:** Kerr (2006) found that there is uncertainty as to whether the HKm may lead to further deforestation by people who want to gain legal tenure over forestland. This has been raised as a concern because the HKm program allows people to gain legal access to previously encroached state-protected forests. Due to inadequate monitoring capacity, there isn't enough evidence to confirm or deny this potential adverse effect of the program.

Social benefits

- As well as gaining recognition of their right to stay on the land they farm, participants also hope to be recognized as official settlers and so gain access to government infrastructure, such as schools, roads and agriculture and forestry extension services.
- Kerr (2005 and 2004) considers that tenure is a particularly important incentive, as participants look forward to no longer having to pay bribes to avoid eviction, to being in a better position to prevent illegal logging by outsiders, and to becoming part of the mainstream of society, with the power to act as partners with the government, for the first time. Tenure also results in the greater empowerment of local farmer groups, as it allows them to become independent in negotiating their needs and able to share their experiences with other groups in similar circumstances.
- Another important advantage of the program is that, since the application to join has to be made in a group, enterprising people, who want to take advantage of the opportunity it provides, are incentivized to include all their neighbors, thus involving the poor and less enterprising in the initiative.
- Participants believe that HKm offers an opportunity for a secure livelihood (Kerr *et al.* 2005). A survey conducted by RUPES (Suyanto *et al.* 2007) at the household level in two villages, found that poorer farmers are the group that can benefit most from the opportunity the program offers to claim forestlands, as it allows them to access land legally and increase their income through environmentally benign coffee agroforestry.

m) Constraints

- There are limited human and financial resources in the Forestry Department to deal with the HKm, particularly in terms of providing information and facilitating access to the program.
- There is a lack of information about the HKm policy from credible sources, to support the group's formation and progress.
- The application process is long and costly. Although it is not complicated on paper, in practice it takes time.
- The decision making process behind the establishment of both group rules and a five-year plan for the development of the forest land in question requires extensive negotiation between group members and entails considerable effort and cost (Arifin 2006). Some members have to take a day-long trip from where they live up in the forest area and have to rent a motorcycle, and therefore pay very expensive transportation costs, because of the bad quality of rural roads.

n) Lessons learnt

- **Role of intermediaries:** Intermediaries, such as NGOs, are very important for the effective implementation of negotiation support systems and to help develop multi-stakeholder strategies to reduce transaction costs. Their involvement is especially useful as it can help ensure that conflicts are resolved. NGO participation also improves trust and helps share the responsibility of achieving more sustainable resource management (Arifin 2006).
- **Trade-offs between environmental goals and poverty reduction:** RUPES' studies in Sumber Jaya have shown that soil conservation efforts could be much more cost-effective if efforts were channeled to privately owned lowland riparian areas instead of to the upper slopes where the HKm

operates. However, the lowland areas are inhabited by wealthier landowners, whereas poorer groups live in the higher forest areas (Kerr 2004).

- Targeting the scheme at riparian providers would increase the environmental benefits it delivers but would undermine the opportunity for poorer, upstream groups to improve their situation. It should be noted that participants benefit from being granted access to “protected forest” in return for the environmental services they provide through the commitments they make to implement soil conservation measures. This is a common trade-off found in PES-type initiatives. It is one that must be made clear to all parties, particularly those who are contributing to the scheme and who are expecting delivery of the service they are paying for.
- Clear land ownership and community involvement in forest management are key determinants in securing sustainable land management in the Sumber Jaya area.

4.2.3 CASE 3: Protection of Cidanau Watershed

a) Location: Cidanau Watershed, Banten Province, Indonesia.

b) Driver: Cidanau Watershed covers 22,036 ha and supplies water for domestic, industrial and agriculture use. However, in the late of 2000's, the water resource was exposed to multiple threats, including encroachment and the conversion of forest to farmland. These pressures led to the clearance of most forestland in the watershed (Budhi *et al.* 2008). In addition, agricultural fertilizers and pesticides have caused widespread water pollution in the region. Additionally, the water flow in the watershed has fluctuated significantly and this motivates demands for a sustainable water supply.

As a result, the water supply company PT Krakatau Tirta Industri (PT.KTI) initiated a PES test project in 2004 to try and deal with the problems in the watershed. This involved funding farmers in the upstream portion of the Cidanau Watershed to grow trees and apply conservation techniques on their farms.

c) Stakeholders:

- i. The service providers are the groups of farmers in the upstream of Cidanau Watershed.
- ii. PT.KTI acts as the project innovator, facilitator and financier.
- iii. The main intermediary body is the Communication Forum for the Cidanau Watershed (FKDC), which was formed with the help of PSDAL-LP3ES (a national NGO) and Rekonvasi Bhumi (another NGO). FKDC formed an ad hoc team to represent FKDC's stakeholders (representatives of the government, buyers, and sellers). This team managed the PES fund, arranged the PES mechanism, and established an independent, transparent, credible, and accountable institution to organize the supply or delivery of environmental services.

d) Facilitators: PT.KTI, NGOs, Forest Office, Agriculture Office, Gubernatorial Office and other local government organizations.

e) Service identification: Water generation and conservation.

f) Tasks of service providers:

- i. To plant and conserve a number of agricultural plants, fruit trees, and other plants to be no less than: a) 500 trees for the first two years; b) 300-400 trees at the end of the third until the fourth year; and c) 250-300 trees at the end of the fifth year (Budhi *et al.* 2008).
- ii. Apply conservation techniques such as agroforestry, and livestock integration, in order to utilize plants as fodder, reduce production costs, increase productivity, and improve income.

g) Payment mechanism: Indirect payment made by PT.KTI through the FKDC. This payment was determined through negotiation between the FKDC and PT.KTI. It was IDR 3,500,00/ha per year for 50 ha

(in the first and the second years of participation). An agreement between FKDC and farmer's group approved the payment to service providers of IDR 1,200,00/ha per year for five years.

- h) **Fund resource:** The PT.KTI Company paid IDR 175,000,000 annually for conserving 500 ha of forest.
- i) **Terms of payment and payment duration:** Payments made were cash and in-kind. Cash payments were made to farmers for planting and conserving the required number of trees in each hectare. In addition, the farmers were given information and technical training on conservation farming to help them increase their productivity and profits as well as conserve the environment.
- j) **Monitoring:** A team selected from the FKDC was appointed to monitor project implementation. This was done following FKDC negotiations with PT.KTI and participating groups of famers.
- k) **Legal feasibility:** This project is considered as a successful example of PES implementation in Indonesia. Its success was partly due to strong government support, which rested on an already established legal framework. Indeed, the PES concept had been established in Indonesia since 2002. This was done through the Development for Transaction Mechanism of PES project, which was located in the Watershed of Cidanau and Brantas, and in West Lombok Regency. Government Regulation No.34/2002 designated water utilization as an environmental service that utilizes forest functions and the supply of forest services. Additionally, Law No. 1/1999 issued on forestry also supports the implementation of PES in Indonesia.

l) Costs and benefits

Economic

- After two years of project implementation, farmers' income in the two villages of Citaman and Cidanau did not change significantly, although it did experience a decrease during the period (Budhi *et al.* 2008). However, the slight decrease in famers' income was caused by a long drought in 2005 which caused fluctuations in agriculture production. As a result, the farmers' perception of the economic benefits of applying conservation techniques has increased.
- PES has generated additional income for upstream famers through cash payments, the enhancement of agriculture productivity, improvements in land quality and fertility, and an increase in the amount of water supplied to households.

Environmental

- A total of 50 ha of land has been conserved. Illegal logging has been reduced, as famers now spend more time on land conservation work and on the application of conservation technology. Moreover, perennial trees and fruit crops have both significantly increased in number. The density of trees has also improved.
- The application of conservation technology has had a huge effect on farmer's knowledge and skills. For instance, the use of higher technology cultivation in sloping land had risen from 78% to 82% after two years of project implementation (2004-2006). Before the project started in the Cidanau Watershed, no farmers knew about terracing. Field workers have played a significant role in the implementation and improvement of terracing in the watershed (Budhi *et al.* 2008). In general, the project has had a significant effect on farmer's skills, and the application of conservation techniques has contributed to an increase in productivity, profits, and environmental service quality.

m) Constraints

- The first constraint facing this project relates to government regulations that overlap and conflict with regulations on conservation and environmental service issues. For example, the regulation of water utilization is addressed in Law No. 34/200 issued on local tax and retribution, which specifies the tax to be levied for the exploitation of surface and ground water. Meanwhile, based on Government Regulation No. 34/2002, water users are asked to pay an environmental service cost, water use being considered a direct use of the forest service (Budhi *et al.* 2008).
- The payments that are made through this project have been agreed through negotiation and are not based on service values or opportunity costs.

- The plan to sustain the fund has not been clarified. Currently, PT. KTI Company is the only buyer, whereas the local, state-owned water supply company and farmers who farm around the watershed are also beneficiaries but do not pay into the scheme. In addition, other potential users have not been sought out to try to increase and maintain the PES fund.
- Local farmers and the local government have not yet gained adequate knowledge and understanding of the PES concept and its implementation.
- As PES has only been initially implemented, there is not enough experience to apply the program well.

n) Lessons learnt: To implement PES successfully, the following issues must be addressed:

- An education and public awareness campaign on PES policy and process is highly recommended. This should be designed to improve local authorities' and local farmers' awareness of the scheme and to encourage their participation. Information on PES implementation should be delivered widely among stakeholders.
- The environmental services to be supplied and the key stakeholders (along with their rights and responsibilities) need to be clearly determined. It should be made clear, through negotiation or agreement, that if upstream farmers do not plant the required trees and implement the appropriate conservation technology, then no compensation or other payments will be made. Furthermore, the 'payment responsibility' of users must be set out in a Memorandum of Understanding, which should be signed by all relevant parties.
- A legal support framework is essential for the implementation process to be successful and to encourage stakeholders to follow the program.
- Cash and in-kind payments create different kinds of payments that can satisfy different kinds of service providers (some need cash, some need cultivation skill support, etc.).
- It is also recommended that some big companies should be encouraged to start implementing such a project; especially those that consume large amounts of water. On the other hand, as initiator and regulator of PES programs, the government has a key role to play in improving and maintaining such programs (Budhi *et al.* 2008).

4.3 Philippines

PES is at an early stage of development in the Philippines and only a few PES-like schemes have been identified (Huang *et al.* 2009). The PES or PES-like schemes in the Philippines aim to improve the living standards of local people and drive environmental conservation. So far, the development of a legal framework (including government acts and other regulations) indicates that PES implementation in the Philippines has potential. Hence, several PES schemes have been piloted and officially implemented at the level of the commune, district, and province. This has been done with the support of ICRAF, the World Wildlife Fund (WWF), Cooperative for Assistance and Relief Everywhere (CARE), and the Resource, Environment, and Economics Center for Studies, Inc. (REECS).

4.3.1 CASE 1: Maasin Watershed Reserve Forest

- a) Location:** Maasin Watershed, Iloilo Province, Panay Island, the Philippines.
- b) Driver:** This study case demonstrates a very early attempt to apply a PES framework to rehabilitate an environmental resource: the Maasin Watershed. This watershed has an area of 6,378 ha and is located in the municipality of Maasin in Iloilo Province. It is the major source of domestic water for Iloilo City, which lies in the Visayas Region. It is classified as a reserve and managed by the government. However, in recent years, the watershed has had to deal with the degradation caused by agriculture encroachment and firewood collection. The degradation of the watershed has caused increasing water scarcity and frequent floods. As a result, the Iloilo City Government had great interest in preserving the main source of water for the city and the Maasin municipality wanted support to manage the watershed reserve.

In the early 1990s, management of the watershed passed into the hands of a multi-sectoral task force under the authority of the provincial and local government. A feasibility plan was designed in collaboration with a local NGO. This recommended social-agroforestry as a means of adequately managing the watershed, while still allowing farmers to remain in the reserve. After several phases of replanting and as a result of the continuing degradation of the watershed, the Department of Environment and Natural Resources (DENR) created a forestry sector subproject (active between 1998 and 2003) to rehabilitate the Maasin Watershed.

c) Stakeholders:

- i. Following the previous program (the Maasin Watershed Rehabilitation Program), this program also selects similar participants. Farmers living or farming in the watershed reserve are perceived as service providers.
- ii. Metro Iloilo Water District (MIWD), a water supply and sewerage system company, is seen as the service user.
- iii. Intermediaries are the Tigum-Aganan Watershed Management Council and the Kahublagang Sang Panimalay Foundation (KSPFI), a local NGO. The KSPFI has volunteered to work with the Provincial Task Force to help with the rehabilitation of the Maasin Watershed.

d) Facilitator: MIWD worked as service user. DENR was directly responsible for system operations and management. It also participated in watershed rehabilitation activities. Additionally, the Iloilo Watershed Management Council and other government organizations have participated in the rehabilitation of the Maasin Watershed.

e) Service identification: The Maasin Watershed provides the following services: i) it is a forest reserve; ii) it provides drinking water to Iloilo City as well as the neighboring towns; and iii) it provides an irrigation system for local farmers. The main environmental service linked to this project was therefore determined as the regulation of water flow.

f) Tasks of service providers:

- i. Improve farm and forest management practices through agroforestry;
- ii. Reforestation of commercial plantations; and
- iii. Rehabilitation of degraded ecosystems by allowing natural regeneration and by promoting other kinds of vegetable cultivation.

g) Payment mechanism: An indirect payment mechanism using in-kind and cash payments has been established. A key actor in this is the local government; it collects money from users (MIWD) and then allocates it to providers.

h) Fund resource: The fund is made up of: i) user fees paid by MIWD; ii) money allocated by the DENR; and iii) other donations from organizations such as the Japanese Cooperation, Asian Development Bank, and other civil society groups.

i) Terms of payment and payment duration:

- i. As the service user and in payment for watershed conservation, MIWD pays a real estate tax and a 1% user's fee annually to KSPFI and the Tigum-Aganan.
- ii. Service providers receive in-kind, one-off payments. For example, communities organized as People's Organization Federations (KAPAWA) were paid reforestation labor costs for planting mahogany, fruit trees, and mixed species. They were then asked to take care of the trees and were assured a 70% share of the harvest for 25 years (Salas 2004).

j) Monitoring: The project assigned a large proportion of its funds to the development of infrastructure for the management and monitoring of the watershed reserve. This infrastructure included a bunkhouse, lookout towers, trails, and fire lines. Barangay Information Center (BICs) did the monitoring based on the Annual Investment Development Plan of the municipality.

k) Legal feasibility: The implementation of the PES-like scheme in the Maasin Watershed was strongly supported by legal frameworks and regulations at both the provincial and national levels. According to the Republic Act 7160 of 1991, the local government is entitled to 1% of the gross revenue obtained from water distributed to water users. As mentioned by Salas (2004), the National Integrated Protected Area System Act (NIPAS) or RA 7586 allows for the creation of Integrated Protected Area Funds with user fees, grants, and donations. The Department of Energy Act and the Electric Power Industry Reform Act created three development funds for areas hosting energy projects. One of these is named the Reforestation, Watershed Management, Health and/or Environment Enhancement Fund Executive Order 318 (2004) on Promoting Sustainable Forest Management. This provides for the proper valuation and pricing of forestry resources. It also provides for the collection of fees for the use of environmental services provided by forests and watersheds. In addition, it provides for a plough-back mechanism that ensures service providers are properly compensated.

l) Costs and benefits

Total cost: The accumulated cost of the project (including government and service user pay-outs and donations) was approximately USD 1.4 million. In addition, during the different stages of intervention in the watershed, significant social costs have had to be paid. These have been associated with unpaid land purchases, evictions and, more recently, the relocation of farmers to adjacent watersheds.

Benefits:

Economic perspective: Farmers gained additional income from the labor payments they received for the reforestation work they carried out. Moreover, they were allocated a 70% share of the harvest from the areas they planted (for a 25-year period).

In terms of the environment: To fulfill the project's reforestation aims, 1,050 ha were reforested. The following environmental improvement activities also took place (Note: Area given over to each in brackets):

- i. agroforestry (1,049 ha),
- ii. assisted natural regeneration (300 ha),
- iii. bamboo plantation (249 ha),
- iv. rattan plantation (94 ha),
- v. riverbank stabilization (330 ha), and
- vi. vegetative measures (20,000 m²).

Consequently, a huge forest area was recovered and water flow and quantity were both improved. This had a positive effect on water supply productivity.

Protective infrastructures: The following were installed: 85 km trails, 700 m fire lines, 77 units of nursery, 7 lookout tower units, 14 Gabion, and 6 concrete dams. Moreover, in the implementation process, several local, provincial, national, and international groups helped build up a social network for local participants.

The organization of the upland communities into KAPAWA facilitated access to capacity building programs and provided assistance that helped establish 17 livelihood projects. Social surveys (conducted to get baseline information for the development of rehabilitation plans) also led to a better understanding of livelihood dynamics in the area. Tenure security was granted via the community-based forest management agreement. However, the Maasin municipality imposed too many land use restrictions, forbidding open cultivation farming and the presence of cattle. It only allowed the cultivation of fruit trees, bananas and bamboos. This led to the abandonment of land by many of the farmers who could not see that the project would supply them with enough income (Salas 2004).

m) Constraints

- At the beginning, most of the potential participants in the region were unwilling to cooperate.
- The project required the participation of various institutions and individuals. However, each of these had different levels of power and authority. This led to an uncoordinated decision making process, which was an obstacle to project implementation.

- The economic value of the trees chosen for planting was not carefully considered. Hence, the potential income that farmers could make from tree cultivation was not as high as it could be, which did not encourage farmers to continue to take care of their trees. In addition, some farmers were not happy when they had to share their harvest with the DENR. Consequently, some of them broke their agreements and switched to other jobs through which they could earn a higher income.
- n) Lessons learnt:** The PES-like mechanism in the Maasin Watershed is a representative case study for watershed management in SEA countries. It has been implemented for a number of years. Its key lessons are:
- Information on the project was delivered by local authorities using a wide-ranging education and communication campaign. This employed printed documents, the radio, and television to generate public awareness and support for the project.
 - The project has demonstrated the importance of its key stakeholders' active role in the protection of the Maasin Watershed and its forest resources.
 - There was not enough clear information on the system of payment and financial distribution undertaken by the different stakeholders. Users therefore refused to pay because they did not believe that the program was being implemented in the right way.
 - MIWD was the only payer. Other beneficiaries were not asked to pay, which may cause free-rider and inequality behavior.
 - The involvement of a number of different participants was a key factor in the implementation of the PES project. However, it would only be a success if there were closer collaboration between them and a clearer understanding amongst them of their rights and responsibilities.

4.3.2 CASE 2: Mt. Kanla-on Spring Water Plant

- a) Location:** Mt. Kanla-on Natural Park, Philippines.
- b) Driver:** The business of the Kanla-on Spring Water Plant (KSWP) mainly depends on the water originating from the Mt. Kanla-on Natural Park. Hence, any changes in forest quality and coverage in this park would directly affect the plant's water resource. Recently, the forest in this park has been degraded because migrant, indigenous people have increased their harvest of timber and non-timber products, and have encroached on the region. Recognizing the negative impact of this development on the business, the KSWP decided to act. In 1997, it began to support the implementation of sustainable agroforestry and reforestation activities of the farmers within the natural park. This was done in order to protect the quality of its bottled water.
- c) Stakeholders:**
- A group of upland farmers in the water reserve of the natural park were the service providers.
 - KSWP is the service user. It is owned by La Tondeña Distillers Inc. and supplies water from the park.
 - An intermediary group is provided by the collaboration between La Tondeña Foundation and the Philippine Business for Social Progress, an NGO (Buric and Gault 2011).
- d) Facilitator:** DENR and NIPAS.
- e) Service identification:** The services supplied by the park are water quality protection, soil preservation (through the maintenance of a healthy watershed), and biodiversity conservation (Francisco 2003).
- f) Tasks of service providers:**
- Rehabilitate the current ecosystem through forest protection and reforestation.
 - Apply conservation technology such agroforestry farming.
- g) Payment mechanism:** Indirect payment through the intermediary group.

- h) **Fund resource:** Although the KSWP was the main payer, major funds for parallel livelihood projects, park protection and conservation activities came from the Global Environment Facility (GEF) of the World Bank (Padilla *et al.* 2005).
- i) **Terms of payment and duration:** Cash payments were made for the labor involved in reforestation and forest rehabilitation. Payment was also made for tree saplings, technical assistance in agroforestry farming, the provision of livelihood projects, social services, and infrastructure support.
- j) **Monitoring system:** The system used in monitoring the achievement of the project was unclear.
- k) **Legal feasibility:** The project was implemented with the support of the government. The legal basis for the collection of fees for environmental services was defined in the NIPAS. This created the Integrated Protected Area Fund (IPAF) through which funds for resource protection and management could be channeled (Buric and Gault 2011).

l) Costs and benefits

Economic perspective: The project's target for 1997 was to reforest 20 ha and rehabilitate 80 ha. To achieve this, 20 upland farmers participated. The total budget for the project was PhP 200,000 (Francisco 2003). The participants received additional income through the payments they received for their labor.

Environmental benefit: 20 ha of reforestation and 80 ha of rehabilitation.

Social perspective: KSWP invested in social development projects to improve local residents' livelihoods by upgrading infrastructure, school buildings, healthcare, and by making cash donations. Consequently, it provided ground water collection devices to 50 local households, constructed an approximately 2-kilometer access road, constructed a two-room school building, organized free medical clinics and nourishment programs, and made extra cash donations. Moreover, it assisted the Ilijan Development Organization (IUDO), a community group of 98 farm families contracted to do reforestation and which was provided with livelihood enhancement programs (Buric and Gault 2011).

- m) **Constraints:** Social payments accounted for a high percentage of the project's total outgoings. However, this project was a parallel livelihood project with the GEF. Hence, it had to evaluate the real impact of its program on social conditions. Additionally, the portion of the fund allocation for environmental and livelihood improvement was not accounted for.
- n) **Lessons learnt:** As the payment had compensated for participants' environment and social investment costs, it made them happy with their reforestation and rehabilitated tasks. On the other hand, the project collaborated successfully with other projects to enlarge its payments and operation.

4.3.3 CASE 3: National Power Corporation Watershed Rehabilitation Funds

- a) **Location:** Watersheds used for electricity production in the Philippines.
- b) **Driver:** In the past, several hydropower companies in the Philippines used water resource services supplied by watersheds without making any contributions (except the resource user fees) to the upstream farmers who helped to maintain these services. Since the mid-1990's, the Philippine national government has made all electricity generation companies that exploited water in this way pay compensation to relevant host communities.
- c) **Stakeholders:**
 - i. Communities in upper watersheds that host hydropower facilities are considered as service providers.
 - ii. Service users are local electricity generation companies.

- iii. Communication between service users and service providers are carried out through an intermediary at the State Department of Energy (DOE).

- d) **Facilitator:** This is unclear.
- e) **Service identification:** Water flow regulation and sedimentation reduction (which, in turn, improves the productivity of electricity production).
- f) **Tasks of service providers:** Commercial plantations were tasked with reforestation duties. Other land users were tasked with improving their farm management practices by implementing agroforestry, and with the construction of erosion and flood control measures (Buric and Gault 2011).
- g) **Payment mechanism:** This took the form of indirect and in-cash payments through DOE (as the intermediary). DOE collected payment from hydroelectricity companies and then allocated it into three funds, namely: i) the Electrification Fund; ii) the Development and Livelihood Fund; and iii) the Reforestation, Watershed Management, Health, and Environment Enhancement Fund. This last fund was intended to provide money for projects that would improve the environment and the livelihoods of local residents. The funds allocated to each watershed depended on the annual working plans submitted by the participating hydroelectricity companies and by the local government to the DOE (Buric and Gault 2011).
- h) **Fund resource:** The fund obtained PHP 0.01/KWh generated by the local electricity producers.
- i) **Terms of payment and duration:** In-cash payments were made to the following types of projects: reforestation and watershed management, environment enhancement, waste disposal, and health system enhancement. These projects were approved annually and it was ensured that the amount of funds that they applied for did not exceed the amount contributed by the local power company.
- j) **Monitoring system:** Monitoring was important and was specified in the project requirements; however compliance was poor (Buric and Gault 2011).
- k) **Legal feasibility:** This project was strongly supported by the national legal framework and by national regulations. For instance, the Republic Act RA 9136 of 2001 indicated the official desire to create the watershed fund. Moreover, the obligation to invest in environment-related projects is on the work list of the National Power Corporation as part of its commitment to sustainable energy. Hence, the payers in this project were totally convinced about the need to provide funds to improve the livelihood and environment of host communities. Moreover, the Republic Act No. 9136: Electric Power Industry Reform Act of 2001, Implementing Rules and Regulations also supports the hydroelectricity companies' investment in generation facilities.
- l) **Costs and benefits:** The Reforestation, Watershed Management, Health, and Environment Enhancement Fund, has supported a total of 349 projects, with a total disbursement of PHP 413,935,169. This money came from 38 power plants over a period of 8.5 years.

Economic benefit: The fund has generated short-term income for upstream farmers who have participated in reforestation and rehabilitation projects.

Environmental benefits: As highlighted by Buric and Gault (2011), water quality has been improved due to waste management controls. Reforestation projects have included the development of nurseries for afforestation and agroforestry and the implementation of structural measures that have led to the control of erosion and floods. Investment in watershed rehabilitation projects accounted for 8% of the investment made through these DOE funds.

Social benefits: Most of the funds have been allocated to social benefit projects, particularly those relating to health care and water supply for the host communities. The host communities have also obtained better infrastructure in the form of electrification, roads, and pavements. Activities have also been funded to support economic activities. These have included: market access improvement; irrigation systems construction; introduction of new economic activities such as aquaculture; food production; training and capacity building; school construction; and the development of better

drainage infrastructure. Moreover, as most host communities have high poverty levels, these projects have contributed to poverty alleviation and a reduction in unemployment.

- m) Constraints:** Project-related information was not delivered transparently; the project's potential to maximize social welfare has therefore not been fully achieved. There are no obvious criteria to evaluate the quantity and quality of supplied services; therefore, it is hard to ask the hydropower companies to trust in the payment mechanism.
- n) Lessons learnt:** The payments made by energy generation companies are aimed at improving both local livelihoods and environment quality. The Reforestation, Watershed Management, Health, and Environment Enhancement Fund supports activities relating to reforestation, watershed management, health improvement, and environment enhancement. However, the fund was allocated mainly to support infrastructure development, water supply, and waste management. It did not support many activities relating to watershed rehabilitation and reforestation.

An important lesson learnt from this case study is that environmental investment is difficult to come by unless the basic social services of communities are met first.

4.4 Vietnam

The PES concept was first introduced and piloted in Vietnam in Hue Province in 2003. The case studies in this section show that there is huge potential for PES to be used in the country so as to achieve sustainable forest management.

In 2006, PES was adopted and supported by Asia Regional Biodiversity Conservation Program (ARBCP). PES has also been developed, piloted and implemented at a national scale as the PFES policy. Vietnam's national PFES pilot policy created the legal framework required to collect and distribute a portion of the economic value of ecological services provided by forests in two pilot areas (Lam Dong province in the south and Son La province in the north). Vietnam is now implementing PFES nationally and this is resulting in many challenges and developments.

In addition to Decree 99³, in Vietnam, REDD is considered as another mechanism of PFES. This project was initially piloted in the Da Nhim Watershed in order to establish a national system for selling carbon credits. Although there is no assessment of the contribution of this project in its pilot period, it has provided valuable inputs and experiences for the further development of REDD projects at both regional and national levels.

4.4.1 CASE 1: Assessing an Economic Approach to Sustainable Forest Management

- a) Location:** The experiment was carried out in a cluster of three selected upland communes (Khe Tre, Huong Phu and Xuan Loc) in Thua Thien Hue province, Central Vietnam.
- b) Driver:** The driver behind this project was the need to compensate the poor people living in the forest areas who have a significant impact on forest services including watershed protection, biodiversity conservation, carbon storage, and the preservation of landscape beauty. These environmental services are very important because they support ecological balance, serve as the base for economic activities and provide a wide range of amenities for society (Francisco 2003).
- c) Stakeholders:** Stakeholders in the experiment included the local Forest Inspection Station (FIS) and the Commune People's Committee (CPC) who volunteered to adopt the proposed forest management practices. In addition, collaborators in the implementation of the experiment included experts from the District Agricultural Office, the Hue College of Economics, and the Hue College of Agriculture and Forestry. Each of the different stakeholders was assigned different responsibilities.

³ Vietnam's Decree 99 on Policies of Payments for Forest Environmental Services was issued in 2010 and is implemented nationwide.

- d) **Facilitator:** The FIS is an executive agency that is involved in the protection and management of forests and forest products. It is under the administration of the respective provincial Forest Inspection Division, which is attached to the Provincial Peoples' Committee.

The CPC guides villages in the design and implementation of forest management and protection plans. It also monitors this work, checks any violations, and works to resolve disputes as per the law.

- e) **Service identification:** Types of environmental services and their values were identified via collaboration between international and national forest experts, local authorities, and related community people. Three major services were mentioned: the elimination of soil erosion, biodiversity conservation, and an increase in carbon sequestration.
- f) **Tasks of service providers:** In this project, payments were made to farmers who managed reforested/afforested plots in a sustainable way through, for example, selective cutting and complementary planting.
- g) **Payment mechanism:** The payment that farmers would require to adopt the proposed approach was explored using secret ballot. This gave an assessment of the so-called willingness-to-accept (WTA) price. Each participant was asked to write on a piece of paper the payment rate (per hectare per year) that they would accept. They were also asked to write down the area for which they would adopt the proposed approach. It was explained in advance that the price and area they gave would be used to help select participants for the experiment. It was explained that those who gave a lower price would have a greater probability of being part of the experiment.
- h) **Terms of payment and payment duration:** In 2003, a total of 45 contracts were signed with the first batch of adopters. The total forest area covered by project was 72 ha, about 1.6 ha/contract. In 2004, the total forest area covered by the project was 134 ha. This included 63 ha that were managed under 41 contracts signed with the second batch of adopters. It also included 72 ha managed under 44 contracts that had been renewed by the first batch of adopters.

Participating farmers were paid in three installments: i) a first payment of 50% of the total value of a contract was made when it was signed; ii) a second payment of 30% was made after six months; and iii) a third payment of 20% was made after 12 months. Any farmer who broke his or her contractual commitments must pay back this money plus a fine. His or her contract would then be cancelled. Other punishments would be applied to those who violated their contracts. Moreover, the FIS would not issue logging permits to any violating farmers unless they paid back the money they had been given along with any outstanding fine.

- i) **Monitoring:** All contracted households were monitored to ensure that they adopted the proposed forest management approach properly. The project stakeholders jointly monitored the project activities. The key players (who did monthly monitoring visits) were the local collaborators (one from each commune). These were assigned by the CPC of the three communes and by staff from the FIS of the area. In addition to this monthly supervision, quarterly inspections were jointly undertaken by researchers from Hue University and by the local monitoring collaborators.

To get permission to harvest forest timber a forest owner had to send a request to the CPC. After making the necessary verifications, the CPC noted and forwarded the request to the FIS for final approval. This meant that the FIS staff and the commune collaborators knew exactly when and where the participating households harvested timber. Monitoring collaborators went to the sites to check that the forest harvesting that took place complied with the study's sustainable forest management approach. This meant that contract compliance monitoring was very effective, although it got more difficult as the number of participants increased. Overall, the monitoring results showed that participating farmers did adopt the proposed approach properly.

- j) **Legal feasibility:** Since 1990, the National Assembly of Vietnam has issued a number of laws that have established a legal framework for the management of environment and natural resources, including forests. Major laws include the Land Law and its multiple revisions (1993, 1998, 2000, 2001), the Law on

Forest Protection and Development (1991) and its revision draft, and the Law on Environmental Protection (1991).

- k) **Costs and benefits:** The costs and benefits associated with the adoption of a resource management program depend on forest plantation characteristics such as acreage, slope, soil fertility, potential growth, and distance to a road. Therefore, plantation characteristics are important explanatory variables when it comes to farmer participation in such programs.

l) **Constraints:**

Ownership: In Vietnam, land is owned by the state. However, forest and forestland can be contracted or allocated to farmer-households and village communities. Given this context, the PES concept would be most applicable to production forests, not to protection and special use forests where the state owns the forest resources.

Limited environmental service market developments: The environmental services provided by production forests seem to be of limited concern to policymakers and have largely been ignored. This is also reflected in the relatively low levels of interest that PES receives in Vietnam.

Fragmentation: On average, each household has only 2 ha of plantation and this is often fragmented into several plots. It is very difficult to monitor the compliance of a large number of contractors working in forest areas scattered in many different places.

Effectiveness of the prevailing tools: In Vietnam, the current CAC system works relatively well. It is therefore unlikely that the State would deliberately allocate more protected forestlands to households. Vietnam is a country with a substantial planning tradition and only an incipient market orientation; compared to PES, the established CAC measures therefore provide a more reliable nature conservation and land use control mechanism.

- m) **Lessons learnt:** Though the property rights system in Vietnam is complicated, and awareness and concern about PES remain limited, a lot of useful work could be done in Vietnam to bring PES or PES-alike initiatives into the CAC system. However, more experimental policy/program trials should be tried to gain further experience and knowledge before any large-scale implementation of a PES scheme is tried.

Forest environmental services, especially watershed protection from production forest, should remain the priority for any PES experiment. Future experiments should not only be targeted at small farmers but also at State Forest Enterprises (SFEs), which manage a large area of production forest. It might be easier to work with SFEs and there would also be opportunities to reduce transaction costs.

4.4.2 CASE 2: PFES Pilot Implementation in Lam Dong Province from 2006-2010

- a) **Location:** Lam Dong province, Vietnam.
- b) **Driver:** Vietnam, like many countries in SEA, has seen the loss of critical forestlands and has suffered other environmental degradation due to the expansion of agriculture and unbridled economic development. Conservation of vital habitats is more likely if forest owners and forest-dwelling communities can be compensated for the true economic value of the services that intact ecosystems provide. Such services include the protection of water quality, the prevention of soil runoff (which, in turn, reduces the siltation of hydroelectric reservoirs), the provision of natural forest products (which can be harvested), and the aesthetic appeal of natural landscapes (which is important to tourism).
- c) **Stakeholders:** ARBCP, Lam Dong Provincial Peoples' Committee (PPC), the Department of Agriculture and Rural Development (DARD), the Ministry of Agriculture and Rural Development (MARD), MARD's Forest Protection Department (FPD), the Office of the Government, the Ministry of Planning and Investment, the Ministry of Finance, hydropower companies, water supply companies, tourism companies, communities, and local households.

- d) **Facilitator:** Winrock International's ARBCP (WI-ARBCP).
- e) **Service identification:** ARBCP's initial forest valuation study for the Da Nhim Watershed provided baseline estimates of the tangible economic value of two vital environmental services provided by intact forests (Thanh 2008).
- f) **Tasks of service providers:**
- i. Maintaining and improving the forest and soil by patrolling regularly according to a fixed schedule.
 - ii. Patrolling and guarding the forest to promptly detect and stop any illegal encroachment activities or any activities that could harm the forest.
 - iii. Installing signage provided by the province to demarcate the boundaries of the contracted area.
 - iv. During the dry season, clearing and treating combustible materials, establishing fire breaks, constructing makeshift fire sentry towers, and supporting firefighting efforts when needed.
- o) **Payment mechanism:** Lam Dong's Forest Protection and Development Fund (FPDF) serves as a key financial component of Vietnam's first decentralized budget transfer mechanism. The provincial FPDF was set up to receive Forest Environmental Service (FES) payments, transfer them to service providers (forest owners), and ensure that the relevant services are properly delivered.
- p) **Fund resource:** USAID, PFES buyers.
- q) **Terms of payment and payment duration:** In 2009, the province decided on payments of VND 290,000/ha per year for the Da Nhim Watershed and VND 270,000/ha per year for the Dai Ninh Watershed. In 2010, the province increased payment levels (through two legal decisions) to VND 400,000/ha per year in the Dai Ninh Watershed and to VND 350,000/ha per year in the Da Nhim Watershed. This was a corrective administrative step that was taken to accelerate the disbursement of funds. These funds had accrued during delays in the allocation of land and in the contracting of farmers to provide forest protection services.
- r) **Monitoring:** Lam Dong Province established a monitoring system involving the participating communes, wards, and districts. This system was designed to help forest-owner organizations encourage contracted households to fulfill their obligations as well as to monitor contracting and payment procedures. Regular monitoring at the local level, along with formal and informal stakeholder consultations, has helped identify problems with the implementation of the pilot scheme. It has also helped deliver quick adaptation and conflict resolution when required.
- s) **Legal feasibility:** In 2007, significant efforts by key decision-makers within MARD led to a request for ARBCP to help develop a pilot policy for PFES in Vietnam. The result was a globally and regionally significant policy, which was approved under Prime Minister's Decision No. 380/QĐ-TTg2, dated April 10, 2008 (with activities undertaken through December 2010). MARD led implementation of the pilot policy in cooperation with Lam Dong Province in the south and Son La Province in the north. ARBCP was selected to undertake implementation in Lam Dong Province, while the German development agency GTZ supported activities in Son La Province.
- t) **Constraints:** While studies were undertaken to determine the K coefficient for PFES payments, Lam Dong Province elected to keep PFES payments consistent across all areas on a per-hectare basis, regardless of forest quality and degree of threat. This decision was taken because the communities (who were primarily K'ho) wanted an equal distribution of payment, and saw the K coefficient as a source of potential social discontent. Nevertheless, if these payments are to be effective in encouraging communities to keep forests intact and to improve forest quality through sustainable land management practices, the K coefficient will have to be employed in due course.

Despite the fact that extensive studies were done to value the ecosystem services (as well as arrive at the K coefficient), the final payment structure also took into consideration the socio-economic and socio-political factors of the communities in question. While scientifically robust, strictly adhering to the results of the valuation studies would not guarantee the uptake of the project and the backing of the community and payers.

- u) **Lessons learnt:** The development of the management mechanism was greatly assisted by local household participation in its design, implementation, and evaluation. Local stakeholders suggested that payments through the Forest Management Boards (FMB) would be the most effective approach because they could then track the payments and have a forum to resolve disputes.

Setting up the PFES pilot policy and implementing it appropriately required the collaboration of many disparate stakeholders, from the national level (e.g., MARD and other relevant ministries and agencies) to the provincial level (the PPCs of the two provinces). However, subordinate technical agencies did not always work closely together nor did they always work in a timely fashion. This resulted in the project's implementation being slower than it might have been, especially with respect to the allocation of the budget to the province.

Key to the success of the valuation studies was the involvement of technical staff from the Da Nhim Hydropower Station. Their involvement in the design and implementation of the valuation studies assured that relevant research questions were being asked; as a result, they were better able to articulate the results to policy decision-makers.

4.4.3 CASE 3: Avoided Deforestation and Forest Degradation (REDD) in Da Nhim Watershed

- a) **Location:** Da Nhim Watershed, Lam Dong Province, Vietnam.
- b) **Driver:** The objective of the general program is to generate economic incentives and increase forest protection in order to avoid deforestation and forest degradation in the Da Nhim Watershed.
- c) **Stakeholders:** Forest owners, DARD, ARBCP, District People's Committees (DPC).
- d) **Facilitator:** ARBCP.
- e) **Service identification:** The project will achieve greenhouse gas (GHG) emission reductions by avoiding deforestation of the predominantly natural pine forest that falls outside the three main forest types (i.e., protection, production and special-use forests). This unclassified forest area was slated, under a Provincial Plan, to be converted to non-forest uses (namely hi-tech agriculture and subsistence agriculture) by 2020. As such, the avoidance of deforestation of the forest will reduce emissions that would otherwise have resulted from the felling of the trees. The continued growth of the trees will also sequester carbon dioxide from the atmosphere in their above- and below-ground biomass. In this way, the project will achieve GHG removal using a carbon sink.
- f) **Tasks of service providers:** Similar to the PFES scheme, patrolling, and fires prevention.
- g) **Payment mechanism:** Through the FPDF.
- h) **Fund resource:** Carbon credit buyers in the Voluntary Carbon market.
- i) **Terms of payment and payment duration:** 30 years as per the project timeline.
- j) **Monitoring:** NGOs and local forest authorities.
- k) **Legal feasibility:** The legal feasibility of the project is based on Directive 38/2005/CT-TTG of the Prime Minister, which relates to the review and re-planning of the 03 forest categories (dated December 05, 2005). In response to this directive, and as required by all provinces, Lam Dong province has carried out a review and re-planning of its 03 forest categories for the period of 2008-2020. Besides re-planning the 03 forest categories into special-use forest, protected forest, and production forest, the province has other forest areas that have been designated "unclassified areas".

Under Lam Dong Province's Decision 450, 47,892 ha of land have been deemed as "unclassified areas". This land includes 24,833 ha of natural forest. These unclassified areas are divided between many districts. Each district has plans in place to convert these areas to new purposes such as agriculture.

The unclassified areas in the Da Nhim Watershed project area comprise 3,167 ha of forest, which lie in Lac Duong district. The Lac Duong People's Committee has issued Letter 32 (detailed below), which details how these unclassified areas will be converted (mostly to agriculture land).

- l) Costs and benefits:** The initial cost was covered by ARBCP. Revenues from the project should be approximately USD 4.86 million (based on the assumption that carbon prices will be USD 5/tCO₂).
- m) Constraints:** The success of the planned deforestation project hinged on the need to source a lot of documentation to provide details and evidence of the plan itself, the areas to be converted, post-deforestation land uses, deforestation rates, planned logging schedules, proxy sites, deforestation agents, etc. This proved to be very burdensome, and in some cases impossible. This was due to a lack of electronic datasets in the province, due to the fact that the plan did not seem to be fully delineated and due to the fact that many documents were missing.

In the case of the Da Nhim Watershed, much of the land is already being protected under the PFES pilot project. As the REDD project proceeded, it transpired that a large portion of the protected area (perhaps up to 75%) was already allocated to farmers to protect under the PFES, and that they were receiving payments in return. As a result, there is a duplication of participants that makes it hard to distinguish whether any documented effects stemmed from the PFES pilot project or from the REDD project.

- n) Lessons learnt:** In short, the main lesson learnt from this project is that a lot of time and effort must be put into sourcing documentation, to the extent that someone should be working on this project aspect almost full-time. Also, it is clear that the province still lacks the capacity to undertake the work unsupervised, which, in turn means that a REDD specialist should be available to shepherd things along. Such a project definitely requires a dedicated team working on it full-time, and should not merely be added to a team's existing work program.

Overall, it is clear that all voluntary REDD projects at this time are of a pilot nature, including this one. This is due to the simple reason that the international community is only just validating the project methodologies; there are therefore only a few specialists available who have a good working knowledge of the said methodologies.

5.0 EVALUATION OF PES IMPLEMENTATION IN SOUTHEAST ASIAN COUNTRIES

Until now, a number of PES programs have been applied in SEA countries with various levels of adaptation in each PES-like mechanism. However, most applications aim to boost the environmental services and livelihood of local residents and are small-scale and donor-driven.

In this section, the paper compiles and evaluates the accomplishments and challenges from the 12 representative case studies detailed above. The evaluation is analyzed from the following perspectives: policy impacts, efficiency, equity, financial feasibility, and legal feasibility. Although it is still too early to fully evaluate these PES schemes, as they are all at an early stage of implementation and lessons are still more suggestive than conclusive, it is hoped that the lessons from this review will offer some fundamental guidance that will help make the next generation of PES schemes a success.

5.1 General Effect of the PES and PES-like Mechanism

The effect of the PES programs is evaluated based on each program's objective. Since environment degradation and urban poverty are major problems in SEA, most PES schemes aim to solve these problems. Hence, their effect is considered in term of their impact on environmental and economic conditions. In addition, their effect on social integration is also assessed. This is done as most of the schemes aim to strengthen local communities.

The evaluation of these effects would be more accurate if it was done with reference to a baseline situation. However, the detailed data necessary for such an evaluation was not available for all the case studies; hence, the research just concentrates on the differences the programs have made.

5.1.1 Influence on environmental services

In general, most of the cases presented focused on reforestation, rehabilitation, and the application of conservation farming techniques (Table 7). The three case studies from Indonesia indicate that they are responsible for the planting of more than 1,000 ha of new forests. Although there are no details on the current quality of these forest areas, the additional forest would remove current pressure on forest degradation as well as improve local environmental services.

Most of the case studies in Cambodia, Indonesia, Philippines, and Vietnam focus on the protection and enhancement of degraded existing forest ecosystems. In total, these cases have protected approximately 200,000 ha of critical forestland from illegal logging, agriculture conversion, and fire. This work has meant that the forest cover has increased. Consequently, soil quality has improved and soil erosion and sedimentation has been reduced. For instance, the experimental PES case study project in Vietnam reduced soil erosion from 43 tons/ha per year to 34 tons/ha per year (Bui *et al.* 2004).

On the other hand, the water and soil quality in these areas are faced with problems such as pollution, landslides and soil erosion because of poor agriculture practices, and because of the use of large quantities of chemical fertilizers and pesticides. This is why training and encouraging local farmers to implement agroforestry and conservation farming technology is one of the main tasks of all the PES case study schemes in Indonesia and the Philippines.

For instance, in the Sumber Jaya case study from Indonesia, ICRAF's research found that a multi-strata, coffee-based agroforestry system is as good as a natural forest at supplying environmental services. This played a crucial role in initiating a conditional land tenure mechanism in the region (Huang and Upadhyaya 2007). Hence, agroforestry and conservation farming practices contributed not only to environmental improvements but also led to a reduction of agriculture production costs, and helped secure land use rights. As a result, these approaches were shown to be a "win-win" policy in terms of environmental services and agriculture production efficiency.

Furthermore, two schemes in Cambodia have achieved their aim of improving biodiversity value. In particular, the Biodiversity Payment Scheme undertaken by the WCS has protected the nest sites (more than 1,550 nests have been conserved) and the habitats of globally threatened and near-threatened bird species. Consequently, the project has successfully increased the breeding numbers of many species.

Table 7. Environmental effect of PES schemes

	Case study	Environmental influence
1	Agreement for Forest, Wildlife, and Crocodile Habitat Protection in Chumnoab	• 20,000 ha of degraded forest have been protected to improve environmental service delivery and conserve biodiversity. • 10% of the global crocodile population hatched in year one.
2	WCS Biodiversity Payment	Safeguarded over 1,550 nests of globally threatened or near-threatened species.
3	Oddar Meanchey REDD Project	Conserved a 67,853 ha of forest (equivalent to sequestering 7.1 million tonnes of CO ₂ over a 30-year period).
4	RUPES - Singkarak Watershed, West Sumatra Province	• Rehabilitated 540 ha/year, or about 2,700 ha in five years. • Implemented agroforestry and conservation farming technology.
5	Way Besai Watershed, Sumber Jaya, Lampung Province	• Conserved and protected existing forest. • Agroforestry of timber and fruit trees. • Achieved erosion reduction of greater than 20%.
6	Cidanau Watershed, Banten Province	• Reforestation of 500 ha. • Application of agroforestry and livestock integration.
7	PES in Maasin Watershed, Iloilo Province	Reforestation and rehabilitation have been implemented.
8	Mt. Kanla-on Spring Water Plant	• Implemented 20 ha of reforestation and 80 ha of rehabilitation. • Two nurseries have been established and 100,000 fruit trees have been cultivated.
9	Watershed Rehabilitation Funds	• Water quality has been improved. • Reforestation and agroforestry projects have been implemented. • Erosion and flood control structural measures have been built.
10	PFES in Upland Central Vietnam	Overall, the program has delivered watershed protection, carbon sequestration, biodiversity conservation, and preservation of landscape beauty for 206 ha of forest.
11	PFES in Lam Dong Province	Project has protected upstream watershed forest (and its environmental services) to maintain water quality and quantity, control soil erosion, and preserve landscape value. The total protected area stands at 209,705 ha.
12	REDD in Da Nhim Watershed	Project has protected of 74,168 ha of forest for carbon sequestration and to mitigate climate change.

5.1.2 Economic effect

Not many previous researches have evaluated the impact of PES schemes on the economic condition of local residents or participants. This paper aims to assess PES schemes on the extent to which they affect the livelihood of participants in terms of income and access to finance and loans.

Qualitatively, most of the assessed PES cases have increased their participants' income through employment, agriculture productivity improvements, and by providing additional income from forests (Table 8). Most of the PES schemes in the four countries have paid participants for reforestation and rehabilitation work, based on the labor they have provided.

Table 8. Preliminary economic impact of PES schemes

	Cases	Payment
1	Agreement for Forest, Wildlife, and Crocodile Habitat Protection in Chumnoab	Total annual payment was USD 30,000.
2	WCS Biodiversity Payment	Famers are paid USD 1/day for work and USD 1/day extra if nest protection is successful. The total payment of USD 2/day was increased to USD 2.50/day due to rising food prices.
3	Oddar Meanchey REDD Project	• First sale of carbon credits expected in 2012. Net annual revenue from carbon sale is USD 319,891; 50% of this is allocated to forest holder communities. • Forest holders have secured land tenure rights for 30 years.
4	RUPES - Singkarak Watershed, West Sumatra Province	• 2005: The Nagari Paninggahan village received about USD 40,000 (given to the representatives of service providers). • 2009: The Dutch company paid USD 1,000/ha for 28 ha of reforestation over a 10-year period. • <i>In-kind payment</i>: Forest land tenure granted for 5-10 years; additional income obtained from the forest area (timber and non-timber) and from farms.
5	Way Besai Watershed, Sumber Jaya, Lampung Province	• Forest land tenure for a 5-year period. • USD 250 for sediment reduction of less than 10%, up to USD 1,000 for sediment reduction of 30% or more. • Multi-strata coffee farms provide livelihood to farmers and control erosion.
6	Cidanau Watershed, Benten Province	• Agroforestry utilized plants, reduced production costs, increased productivity, and improved income. • Payment of USD 120/ha per year for 5 years of reforestation.
7	PES in Maasin Watershed, Iloilo Province	• Participants were paid for reforestation labor (planting mahogany, fruit trees, and mixed species). They were then asked to take care of the trees and were assured a 70% share of the harvest for 25 years. • USD 1.4 million has been expended.
8	Mt. Kanla-on Spring Water Plant	• Upstream communities were paid for their reforestation and rehabilitation labor. They were also provided with tree saplings, technical assistance in agroforestry farming, and livelihood projects (with a total budget of PhP 200,000 in 1997). • Local farmers (51) were trained in sustainable agroforestry.
9	Watershed Rehabilitation Fund	Generated short-term income for upstream farmers who are participating in 349 projects. A total disbursement of PhP 413,935,169 (for reforestation and rehabilitation) was provided by 38 power plants.
10	PFES in Upland Central Vietnam	The average payment to households was approximately VND 230,000/year (to 89 households). On average, this was equivalent to 2% of household income. However it represented 4% of the household income of poorer non-adopter households.
11	PFES in Lam Dong Province	The socio-economic survey showed that the pilot PFES policy plays an important role in providing families with cash income, with 72% of the surveyed households indicating that PFES was "very important". PES has paid a total of VND 79 billion to 9,870 households.
12	REDD in Da Nhim Watershed	Similar to the PFES policy.

For instance, in the case of Cidanau Watershed in Indonesia, the project paid participants USD 350/ha per year for reforestation work. This payment has contributed to an increase in household income of 30% (Mbak 2010). In the case of Indonesia's RUPES - Singkarak Watershed project, participants were paid USD 1,000/ha to prepare land, buy seed, and plant and maintain trees for a 10-year period. In the PFES project in Lam Dong, Vietnam, participants have been paid around USD 18/ha per year for forest protection. This payment has contributed to an average rise in participants' annual income of about 5%. In the PES experiment in Hue, Vietnam, the average payment that a participating household received was approximately USD 12/ha per year, which is equivalent to a 2% rise in household income (Bui *et al.* 2004). In the WCS Biodiversity Payment project in Cambodia, participants were paid USD 2/day to conserve protected areas, especially around bird nests. Although no research has been done to find out whether this payment really has a positive effect on household income, negotiations with participants have indicated that they perceived the benefit of being involved with the program.

In terms of in-kind payments, it is clear that land tenure is a good reward for participants, particularly in countries where individual land rights are weak. This is shown in the case of the RUPES - Singkarak Watershed project, which provided participants with forestland tenure for between 5-10 years. It is also shown in the Way Besai Watershed project in Indonesia, which rewarded participants with forestland tenure for a 5-year period. Hence, participants could generate additional income from the forest (such as non-timber and timber products) so long as they sustained the density of trees on their plots as required.

Moreover, through the implementation of agroforestry practices, many of these projects helped farmers save money by lowering production costs and increasing productivity. In addition, they could share their forest harvests. For instance, in the case of the PES project in Maasin Watershed in the Philippines, participants were paid for their reforestation labor and for planting mahogany, fruit trees, and mixed species. They were also assured a 70% share of the harvest for 25 years when taking care of the trees.

Generally, most PES schemes in SEA have targeted cash and in-kind (such as land tenure and assistance with conservation farming techniques) payments. The effect of these schemes on household income has been positive although limited. Additionally, because payment levels have not really been based on the total value of services, or the opportunity cost of generating these services, most payments have not been large enough to convince stakeholders that it makes financial sense to participate. Even more importantly, participants have not been allowed to convert forests to agriculture land, from which they would earn a higher income. These payments have, to a greater or lesser degree, contributed to an improvement in local livelihoods and have helped alleviate poverty. These programs did not support the service providers in term of providing loans or collateral.

5.1.3 Other social implications

In the first stage of PES implementation, one major accomplishment that has occurred in most countries has been an improvement in the awareness of local residents and authorities on the PES concept and its implementation mechanism. Training on conservation farming technology and techniques has increased the awareness of local farmers and authorities on the value of environmental services and on incentive-based mechanisms.

Bui *et al.* (2004) reported that the implementation of the PES concept in Hue, Vietnam was the first time that the district's agricultural officers had learnt about the PES concept and that it had helped them to better understand the advantages and disadvantages of their existing CAC approach.

In addition, in all the PES cases reviewed, contracts relating to the improvement of environmental services had been signed by communities or groups of people, rather than individuals. This has helped to generate solidarity among participants, especially in remote areas. Linkages between community groups, local authority departments and international organizations have also been increased by those PES schemes that require the involvement of different stakeholders.

Moreover, in projects that involved hydroelectricity plants as service users, there have been opportunities to improve the social conditions of both participants and non-participants in a variety of practical ways. For example, KSWP has provided ground water collection devices to 50 households locally,

an approximately two-kilometer access road, a two-room school building, free medical clinics, and nourishment programs (Francisco 2003).

5.2 Analysis of the Efficiency of These Programs

The less a scheme costs to achieve a given target, the more efficient it is. Hence, to evaluate the efficiency of the PES cases reviewed, information is needed on the total cost of PES implementation and its achievement. Most of these studies did not measure all aspects of the impact of the PES schemes on environmental services along with their economic and social effects. Each of them measured either environmental service effects or economic effects or social effects.

Hence, the efficiency of most of the case studies cannot be accurately assessed. This is compounded by the fact that the context in which the PES mechanism operates is normally characterized by a high level of uncertainty about environmental additionality (Pascual *et al.* 2010). Therefore, this paper only analyzes the efficiency in which each program has achieved its objectives. It assesses factors such as environmental service additionality, compares transaction costs with payments, looks at how contract compliance is monitored and sanctioned, and assesses opportunity costs.

Following this analysis, it is clear that most PES schemes have, more or less, met their initial objectives. In particular, several targets relating to reforestation and rehabilitation have been achieved.

Most of the case studies did not provide accurate data on transaction costs and benefits. There was therefore not enough information to clarify and compare the efficiency of the different projects in terms of costs and benefits. Hence, this paper only calculated the ratio of transaction costs and payments to local participants versus the total cost of each program. This was done in order to assess whether transaction costs were applicable or not.

Generally, PES transaction costs are related to scheme features such as the scale of implementation, process, and the program's objectives. The bottom line is that it takes time and money to carefully prepare and design regional or national schemes for environmental service payments. For instance, it took between five and six years to design the PFES national policy project that was piloted in Lam Dong, Vietnam. This work involved an evaluation of the environmental services the forest provided, so that the project payment level could be properly set. Moreover, as PFES was a new concept to most of the project's stakeholders, the scheme had to devote significant human resources and time to several publicity campaigns. These were designed to enhance stakeholder awareness of the program as well as to help its implementation process. Consequently, after two years of pilot work, transaction costs had accounted for 42% of the total funds provided by service users and international donors (Table 9).

In addition, if a PES program aims to set up a payment system based on environmental service values or opportunity cost, the transaction costs of doing this can be relatively high. This is especially true for small-scale applications or experimental trials. The PFES case in Upland Central Vietnam provides an example of this. The program's payment framework was based on the willingness of local residents to follow the prescribed forest protection program. This program also set up a process to measure the linkage between payments and improvements in environmental services (particularly relating to soil erosion). These large tasks were done in relation to the payment of only 86 contracts. These contracts related to 206 ha of degraded forest and a two-year experimental time period. Consequently, the transaction cost accounted for 46% of a total budget of USD 4,934 (Table 9).

In general, the average transaction cost of the cases reviewed was 31% of their total costs, while payment for service providers accounted for 50% of these costs. Compared to the previous studies mentioned in Leimona's thesis (2011), the transaction costs of community-based resource management in Nepal were found to account for between 14% and 26% of total costs. This means that the level of transaction costs found in this study appears reasonable. It is also supported by research on the transaction costs of small-scale carbon projects, which were found to range from 13% to 30 % of total project costs.

Table 9. Annual transaction costs and related costs in implementing the PES schemes

	Cases	Total cost (USD)	Transaction cost	Paid providers	Other costs (tax, social infrastructure)	Period (year)	Source
1	Agreement for Forest, Wildlife, and Crocodile Habitat Protection in Chumnoab	11,870	28%	35%	36%	1	Som <i>et al.</i> 2006
2	WCS Biodiversity Payment	26,119	27%	45%	28%	3	Clements <i>et al.</i> 2010
3	Oddar Meanchey REDD Project	379,188	1%	65%	34%	30	Poffenberger <i>et al.</i> 2009
4	RUPES - Singkarak Watershed, West Sumatra Province	40,000	36%	64%		1	Huang <i>et al.</i> 2009
5	Way Besai Watershed, Sumber Jaya, Lampung Province	864,140	24%	68%	8%	5	Arifin 2006
6	Cidanau Watershed, Banten Province	75,000	14%	80%	6%	4	Mbak 2010
7	PES in Maasin Watershed, Iloilo Province	350,000	23%	77%		25	Buric and Gault 2011
8	Mt. Kanla-on Spring Water Plant	4,311	N/A	non-cash			Francisco 2003
9	Watershed Rehabilitation Fund	9,810,503	59%	8%	63%	8.5	Buric and Gault 2011
10	PFES in Upland Central Vietnam	4,934	46%	20%	24%	2.17	Bui <i>et al.</i> 2004
11	PFES in Lam Dong Province	4,813,750	42%	49%	9%	2	WI 2010
12	REDD in Da Nhim Watershed	1,820,000	38%	41%	21%	30	ARBCP 2011

However, the range of transaction costs found in this study was relatively wide. For example, in the Watershed Rehabilitation Fund project from the Philippines, transaction costs accounted for 59% of total project costs, which is the highest value for all the cases reviewed in this study. However, this reported cost did not include other expenditures that were made to convince local residents to participate and to improve the local infrastructure such electrification, roads, and pavements.

Similarly, in some of the other studied cases, transaction costs were also combined with other payments. These payments went towards improving market access and irrigation systems, introducing new economic activities such as aquaculture, boosting food production, providing training and capacity building, and building schools and better drainage infrastructure.

Moreover, some of the studied programs had been implemented as experimental trials for short periods and had therefore been completed (e.g., the Agreement for Forest, Wildlife, and Crocodile Habitat Protection in Chumnoab, Cambodia), some were in the process of being implemented (e.g., Watershed

Rehabilitation Fund in the Philippines, PFES in Lam Dong Province, Vietnam from 2006-2010), and some were in the first stage of implementation (e.g., Oddar Meanchey REDD Project in Cambodia). Hence, the transaction costs of such projects were not fully estimated (in the cases where they had not been finished) or were too high during the first implementation period.

In all the above cases, the PES schemes aimed to support activities related to reforestation and rehabilitation (such as training on conservation farming techniques), and to provide labor cost payments for participants. Hence, the transaction costs of these cases accounted for less than 50% of the value of the total funds, and 50% of the funds were used to pay for service providers.

In conclusion, the transaction costs of the reviewed cases varied dramatically and depended on each program's specific targets, scale, and period of implementation. Most of programs' payment mechanisms did not rely on their opportunity costs or the cost of the environmental services supplied (except for two cases in Vietnam).

As well as transaction costs, payment conditions and the effectiveness of monitoring systems were other indicators used to evaluate the efficiency of each of the programs under review. All the programs' objectives regarding environmental services and livelihood improvements were clear. However, it was difficult to evaluate the efficiency of payment conditions and monitoring systems.

In most of the projects, payment conditions were clearly identified and linked to objectives and codes of behavior that were monitored. In Indonesia, the Cidanau Watershed project asked farmers to plant and maintain timber and fruit trees and gave them specific targets (e.g., minimum of 500 trees/ha for five years). In Vietnam, the PFES pilot policy asked participants to take care of the degraded forest and prohibited both illegal logging and the harvesting of non-timber products in the forest; if anyone violated these strictures, then they would be expelled from the program. In the PES project in Maasin Watershed in the Philippines, the first phase provided contracts for five years, which would only be renewed beyond this period if forest groups complied with the project's stated conditions. Similarly, in the PES in Way Besai Watershed in Sumber Jaya, Indonesia, the legal permission to use state-owned protected forest was for a trial period of five years with the possibility of an extension of 25 years only if participants provided the required environmental services in a satisfactory manner (Buric and Gault 2011).

With respect to monitoring systems, it was found that in each country, monitoring was mentioned in the case design. It is the responsibility of the local government in Vietnam, of external organizations such as international donors in Cambodia, of host communities in the Philippines, and of service payers such as hydroelectric plants in Indonesia. However, so far, there have not been any details available relating to the efficiency of these monitoring systems; hence, this study could not assess their effectiveness.

5.3 Equity Analysis

An analysis of the equity or fairness of the PES schemes was done in terms of the equity of access, implementation process, decision-making, and outcome distribution. In other words, equity was analyzed from the perspective of service users and service providers as well as in terms of the interaction between both.

PES schemes aim to resolve the inequity between environmental service providers and local, national or global users. However, because PES is still a relatively new concept in SEA, many environmental service users have not perceived that they have a responsibility to compensate environmental service providers. In addition, local residents who work to protect environmental services have not fully understood that their work has a value or have not known how to ask for compensation. Hence, the drivers for the PES mechanism (government or non-government individuals or organizations) have recognized that there is inequity between the users and providers of environmental services and that a compensation mechanism needs to be put in place. As intermediaries, they have asked for payment from service users and have allocated it, or partly allocated resource taxes or fees, to service providers.

This context applied to most of the assessed cases, especially those that involved watershed payment mechanisms. Traditionally, as service users, hydropower companies and water supply plants just paid resource-use taxes or fees to the government and have given no consideration to the impact of

upstream communities on water flow and generation. Through the assessed PES projects, these service users have taken an interest in the welfare of host communities and have recognized the impact that poor farming practices or illegal logging can have on their operations. They have therefore compensated host communities for the reforestation and rehabilitation work they do. For instance, in the Cidanau Watershed project, the water supply company PT.KTI funded upstream farmers to grow trees and apply conservation farming practice after realizing that the watershed it relied on was polluted and degraded. The PES scheme in Cambodia asked for biodiversity providers to be valued at both a national and global level. In Indonesia, local farmers who contributed to carbon sequestration work have been paid by global users (a Dutch company).

However, inequity still exists between service users and suppliers. For example, several current and potential environmental service users have not paid their dues. These users include small hydroelectric plants in Vietnam, small water supply companies in Philippines, and the national and global beneficiaries of biodiversity in Cambodia and carbon sequestration services in Indonesia. Another problem is that most of the assessed PES projects were pilots or short-term initiatives, while the problems they address are long-term.

Additionally, the land tenure of forestland (in the four study countries) is mainly controlled publicly or by the state, hence, PES project participants could not voluntarily follow the PES mechanism. In other words, farmers could not freely decide to participate in PES projects without having land property rights. Moreover, the overall goal of most of the assessed PES schemes is to support poor upland communities by developing workable schemes that reward them for the environmental services they provide (Suyanto *et al.* 2005). Hence, project participants must satisfy a number of specific conditions (based on each program's objectives). For example, in the PFES pilot policy in Vietnam, the participants must:

- a) be indigenous to the piloted PFES areas (the watershed),
- b) have enough labor to take care of the forest,
- c) voluntarily cooperate with forest owners to preserve and protect the forest, and
- d) lack agriculture land, and be a poor or ethnic household.

The PES scheme in the Maasin Watershed in the Philippines made concerted efforts to target poor and marginalized groups. The project in Central Vietnam specified that participants should have forestland use rights (although if they satisfied this criteria they were free to decide whether to take part or not).

In comparison, in the Sumber Jaya case, the conditional land tenure reward mechanism is voluntary and people do not have to join the HKm groups. Some PES schemes in Indonesia, which provided land tenure rewards, allowed small-scale farmers with informal land tenure to participate.

Furthermore, the output allocation among participants in most PES schemes was relatively equitable. Those schemes that involved payment for watershed services, all asked for a flat payment to be made to participants. This would be equitable if all participants contributed a similar quantity and quality of service. The payment mechanism would be more equitable if the payment was simulated by the distribution ratio of individual service providers. However, currently, no information is available on the different levels of service supplied by providers. Hence, the flat payment approach is the best option.

Furthermore, a typical feature of most PES schemes in SEA is the provision of indirect payments, in which the sellers and buyers work through an intermediary (normally a representative of the local government or service users) who acts as a facilitator to collect and allocate money to service users. These intermediaries usually work under the auspices of service providers, payers, local authorities, and external organization such RUPES and WI that guarantee the allocation of payments between service providers and service users.

With respect to the criteria used to measure the services supplied to users, it is not easy to measure this directly; therefore, it needs collaboration between different stakeholders, scientists and other experts. Currently, the correlation between service payments and service improvement is intangible in all the PES projects in SEA. Hence, an assessment of whether service users are getting an equitable deal will only be available when a system to measure this linkage is implemented. In the case of the PFES project in Lam Dong, Vietnam, four gauging stations have been set up to monitor the quality of forest environmental services in the Da Nhim Watershed. However, currently this project element is only in its initial operating stage, hence, data from these gauging stations are still not accurate.

5.4 Legal Feasibility

Legal frameworks create the general foundation for stakeholder involvement in PES implementation. PES schemes cannot stand alone as an incentive-based mechanism. Enabling policy environments also need to exist to ensure that PES schemes can be operational, and that there are opportunities for PES mechanisms to scale up and out and be sustainable. In addition, policymakers should be able to set at the local, regional and national levels policies that spell out an optimal level of acceptable environmental quality standards (Leimona *et al.* 2008).

PES case studies in SEA countries have been enabled at different levels because there is strong support from related regulations and rules (Table 10). In Cambodia, besides national and local policies related to biodiversity conservation and forest management, the government has signed several international agreements relating to biodiversity conservation and environmental service improvement. These include signing the international convention on biodiversity in 1992, and joining the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and the Convention on Wetlands of International Importance, which is more popularly known as the RAMSAR Convention.

Table 10. Legal feasibility of PES schemes

	Case	Supporting policies
1	Agreement for Forest, Wildlife, and Crocodile Habitat Protection in Chumnoab	1. The Royal Government of Cambodia established wildlife regulations: Preah Reach Kret No. 1296-36 (1996); Article 5 & 6 of Bra Kas No. 1563, 1996; Declaration No. 3837; Decision on preparation and implementation of forestry administration (2003); Forestry concession management decree (2003); Protected Areas Law (2008) 2. Cambodia signed an agreement with the international convention on biodiversity (1992), and joined the CITES and the RAMSAR Convention
2	WCS Biodiversity Payment	1. Royal Government of Cambodia established wildlife regulations No. 1296-36 (1996) 2. Land Law (2001); Forest Law (2002); Natural Protected Area Law (2008); Law on Tourism (2009); Law on Mineral Resource Management and Exploitation (2001); Royal Decree with No. 0606/012 (2006)
3	Oddar Meanchey REDD Project	Sar Chor Nor No. 699 (2002); Forestry Law (2003); Community Forest; Sub-decree (2006); CF Guidelines-Prakas
4	RUPES - Singkarak Watershed, West Sumatra Province	1. National regulation on surface and ground water tax 2. National Clean Development Mechanism
5	WayBesai Watershed, Sumber Jaya, Lampung Province	Hutan Kamasyarakatan (HKm) regulations
6	Cidanau Watershed, Banten Province	1. Development for Transaction Mechanism of PES in the Watershed of Cidanau and Brantas, and in West Lombok Regency in 2002 2. Government Regulation No. 34/2002 3. Law No. 1/1999

Table 10 continued

	Case	Supporting policies
7	PES in Maasin Watershed, Iloilo Province	1. Republic Act 7160 (1991) 2. National Integrated Protected Area System Act (NIPAS, RA 7586) 3. Executive Order 318 (2004), Reforestation, Watershed Management, Health, and/or Environment Enhancement Fund
8	Mt. Kanla-on Spring Water Plant	NIPAS (RA 7586), which allowed the creation of the Integrated Protected Area Fund
9	Watershed Rehabilitation Fund	1. Republic Act 9136 (2001) 2. Implement the sustainable energy project mentioned in the National Power Corporation's Operation 3. Electric Power Industry Reform Act (2001)
10	PFES in Upland Central Vietnam	1. National Land Law (1993, 1998, 2000, 2001) 2. Law on Forest Protection and Development (1991) 3. Law on Environmental Protection (1991, 2005)
11	PFES in Lam Dong Province	1. Prime Minister's Decision No. 380/QĐ-TTg2 (2008) 2. National Decree No. 99 /2010/ND-CP (2010)
12	REDD in Da Nhim Watershed	1. National Directive 38/2005/CT-TTG (2005) 2. Lam Dong Province's decision 450 3. Project Letter No. 32

Similarly, in Indonesia, there are basic laws in place regarding forest conservation, land use, and how concessions are to be granted. Such national regulations highlight the responsibility of service users through the taxes that must be paid by hydroelectricity plants and the allocation of the resulting funds to local forest and ecosystem conservation. It is basic practice in the country to ask for payment from service users (as well as the government funding) for the environmental protection that host communities provide. In addition, current policies also support the enhancement of land property rights to individuals. For instance, in Sumber Jaya, the passage of social forestry or HKM regulations has created an opportunity to use conditional land tenure as a potential reward mechanism for environmental services (Huang and Upadhyaya 2007).

In the Philippines, most PES schemes were implemented with strong support from the following national and local legal frameworks and regulations:

- a) Republic Act 7160 of 1991, which stipulates that the local government is entitled to 1% of the gross revenues from the water services distributed by the Maasin Watershed;
- b) Republic Act 9136 of 2001, which indicates the official intention to create a watershed fund;
- c) the NIPAS Act, which allows the creation of the Integrated Protected Area Funds (IPAF) with user fees, grants, and donations;
- d) the DOE Act and Electric Power Industry Reform Act, which created three development funds for areas hosting energy projects, one of which is named the Reforestation, Watershed Management, Health and/or Environment Enhancement Fund; and
- e) Executive Order 318 of 2004 on Promoting Sustainable Forest Management, which provides for: i) the proper valuation and pricing of forestry resources; and ii) the collection of fees for the use of the environmental services of forests and watersheds.

Vietnam is considered as the first country in SEA to have launched a national PES policy. As a result, PES schemes in Vietnam have been promoted robustly by a national and local policy framework. PES schemes implemented before 2008 were supported by key related national policies such as the Land Law and its multiple revisions in 1993, 1998, 2000, and 2001; the Law on Forest Protection and Development in 1991; the Law on Environmental Protection (1991) and its revision in 2005; and other local regulations and decisions. However, since 2008, the National PFES policy was launched through Decision No. 380/QĐ-TTg2 on the Pilot Policy for Payment for Forest Environmental Services in Vietnam. Following this pilot stage, in 2010, the Vietnamese government issued the Decree No. 99/2010/ND-CP on the Policy on Payment for Forest Environment Services.

In general, most PES projects in SEA have been promoted by current policies related to environmental and natural resource conservation and management. Only Vietnam has specific national policies for the PES concept; hence, the foundation of its PES policy is clear. But how these mechanisms will work, be sustained, and be scaled up is still in question. Indeed, most of the schemes assessed in this study have only been implemented at a local or regional level, and uncertainty exists over their future development in terms of stakeholder responsibility, contract conditions, and fund management. In Vietnam, however, the legal framework for PES preparation and implementation has been clarified under Decision 380 and Decree 99. Based on this legal framework, the principle to maintain both the PES stakeholders' responsibility and the PES' financial mechanism has been acknowledged.

Additionally, natural resources are often managed by multiple agencies in many countries. Land use planning may be the responsibility of one agency, while water supply may be the responsibility of another. Hence, the success of these PES programs has been helped where there have been management mechanisms that ask relevant authorities and organizations to coordinate their policies and efforts.

5.5 Financial Feasibility

Fund resources are a vital factor in PES scheme implementation. The success of PES schemes is highly dependent on the funds available for capacity building, for the provision of adequate payments to ecosystem services providers, for ensuring PES monitoring and enforcement, and, eventually, for renewing PES contracts after their termination (Greiber 2009).

Following the general principle of PES, payment should be provided by service users. In general, the funds for PES schemes in SEA come from three major sources: government, service users, and NGOs or international donors. Collaboration often takes place between these payers. In this section, the financial feasibility of the assessed schemes is analyzed, both in terms of their implementation and their long-term maintenance.

Most PES cases in the region were driven by donors; therefore, their sustainability mainly depends on the continuation of this donation. One of the key regional donors is ICRAF. With funding from IFAD, ICRAF has played a prominent role in promoting the concept of both cash and in-kind "rewards" for environmental services. It has done this through its RUPES program in Asia. RUPES is actively implementing pilot action sites in Indonesia, the Philippines, Vietnam, and other parts of SEA (Dillaha *et al.* 2007).

In Vietnam, the PFES in Lam Dong and the REDD in Da Nhim Watershed were driven by WI under the USAID-funded ARBCP. However, when the policy was implemented, its funding was provided by service users such as hydroelectricity plants, water supply plants, and ecotourism enterprises. The PFES in Upland Central Vietnam was just 26-month experimental project funded by EEPSEA.

In Cambodia, the Chumnoab Conservation Agreement and Biodiversity Payment schemes were sponsored by CI and WCS, respectively (both only for a limited period).

In Indonesia, the RUPES - Singkarak Watershed project was sustained by the allocation of government funds. These were obtained by imposing taxes on hydropower companies for watershed related services, while a Dutch company paid for CO₂ sequestration services. In the case of the Cidanau Watershed project, funds were paid by a water supply company.

In the Philippines, the Maasin Watershed PES fund was provided by a water supply company (in collaboration with DENR), by international donors such as Japanese Cooperation and the Asia Development Bank, and by civil society groups. In the Mt. Kanla-on Spring Water Plant project, the fund was paid by a private water supply company in collaboration with NGOs. In the case of the Watershed Rehabilitation Fund project, the fund is sustained by hydroelectricity producers.

In comparison, some PES cases in the four study countries relied on government funds (e.g., the Oddar Meanchey REDD Project in Cambodia). However, as financial resources are generally scarce, if a PES scheme is only based on local or national government funds, then its sustainability cannot be ensured. Whereas, when funds are generated by water-related taxes or user fees (such as the Maasin Watershed and the National Power Corporation Watershed Rehabilitation Funds in the Philippines), then their financial sustainability is better assured because such taxes or fees have the backing of government regulations. This is especially so in Vietnam, where the sustainability of PES funds is totally protected by the government's specific PES policy.

Table 11. Financial resources of PES schemes

No.	Case	Fund resource	Sustainability
1	Agreement for Forest, Wildlife, and Crocodile Habitat Protection in Chumnoab	International Conservation.	No
2	WCS Biodiversity Payment	Wildlife Conservation Society.	No
3	Oddar Meanchey REDD Project	DANIDA, DFID, NZAID, experts.	Yes
4	RUPES - Singkarak Watershed, West Sumatra Province	1. Government fund through hydropower company tax. 2. Dutch Company, other Carbon credit buyers.	Yes
5	WayBesai Watershed, Sumber Jaya, Lampung Province	Government (land tenure).	No
6	Cidanau Watershed, Banten Province	PT.KTI water supply company.	No/Yes
7	PES in Maasin Watershed, Iloilo Province	1. Metro Iloilo Water District Company. 2. Department of Environment and Natural Resource. 3. Japanese Cooperation, ADB Bank, and civil society groups.	No/Yes
8	Mt. Kanla-on Spring Water Plant	Kanla-on Spring Water Plant collaborate with Global Environment Facility – World Bank.	No
9	Watershed Rehabilitation Fund	Hydroelectricity Producers.	Yes
10	PFES in Upland Central Vietnam	EEPSEA Project.	No
11	PFES in Lam Dong Province	1. USAID. 2. Service Users.	Yes
12	REDD in Da Nhim Watershed	1. USAID. 2. Carbon credit buyers in Voluntary Carbon market.	No/Yes

Additionally, some PES funds (e.g., in Indonesia and Vietnam) rely on carbon credit buyers in the voluntary carbon market. Currently, it is difficult to assess whether the distribution of this revenue stream to PES funds is sustainable or not, because it relies on an externality that the agencies involved in the PES schemes cannot control. Moreover, carbon markets are still a relatively new concept to environmental service users around the world, and work through a voluntary market system. This uncertainty is shown by the finding that the PES case in Da Nhim Watershed (Vietnam) has not found a carbon credit buyer, whereas, a Dutch company has paid for CO₂ sequestration in the Singkarak Watershed project (Indonesia).

These findings all point to the conclusion that PES schemes should diversify their financial resources to ensure greater resilience and sustainability.

5.6 SWOT Analysis

In order to analyze the feasibility to develop the PES tool in SEA, a qualitative analysis using a matrix that highlights strengths, weaknesses, opportunities and threats (SWOT) was undertaken. The SWOT analysis (Table 12) reveals that, although PES has a number of strengths, it is also has a number of weaknesses that are a cause for concern. In most cases, PES schemes have accomplished a range of environmental objectives and benefited the poor in remote areas. However, because the land owner in each case is primarily the state, this means that the equity of participation is limited and the ability to contribute to environmental service (ES) quality is controlled.

Table 12. SWOT matrix of PES implementation in Southeast Asia

Strengths	Weaknesses
1. A strong base of local institutions, national governmental support, and legal frameworks.	1. Land tenure is not secure, which limits equity and PES' ability to contribute to ES provision.
2. Clearly determines the services and stakeholders, including rights and responsibilities.	2. Ineffective implementation due to the weak PES governance and institutions.
3. Creates a source of revenue for communities and governments.	3. There is no evidence to prove the relationship between payment and ES quality.
4. Addresses environmental improvement and poverty reduction simultaneously.	4. Information on stakeholders and implementation processes is not delivered openly.
5. PES asked for collaboration from authorities/managers.	5. High transaction cost.
6. Mixing cash and in-kind payment creates multi-impacts and meets the need of participants.	6. Overlapped and unsynchronized regulations on conservation and ES (e.g., resource use tax/fee and payment for ES).
7. Increases local farmers', payers' and authorities' awareness of the value of ES and their responsibility to protect them.	7. Limited human and financial resources and, in most cases, a lack of planning to sustain projects/funds in the future.
8. Cost savings are created by group contracts instead of individual contracts.	8. Limited number of ES.
9. Does not require technology innovation.	9. Payment has been based on negotiations and agreements, instead of on the value of services or on opportunity costs (except Vietnam PFES).
10. Beneficiaries or service users are easy to identify and are often willing to pay for ES improvements even though there may be weak scientific evidence.	10. The new form of planning, distribution, and accountability of finance necessary for PES implementation has not yet been clarified.
11. Easier implementation with flat payments and limited ES.	11. Payment conditions and monitoring systems are weak.
12. These programs have proven good impacts that make it easier to persuade service users to pay and to get further support from the government.	12. It can be difficult to establish historic baselines in countries with limited and unreliable high-resolution ES improvement data.
13. Governments and donors have a vital role in promoting equitable governance; securing tenure; putting in place an enabling policy, legal and institutional framework; building capacity; reducing ecosystem service buyer risks and transaction costs; and facilitating participation.	13. Providers have difficulty dealing with the rights and obligations set out in contracts because most of them have little education and are not familiar with contracts.

Table 12 continued

Opportunities	Threats
1. <i>Co-benefits</i>: Besides reducing environmental degradation, PES helps reduce poverty, promotes community development, preserves natural resources, and contributes toward sustainable development. 2. When the population is increasing, the demand for ES from forests and watersheds is also rising fast. 3. <i>Economic development and local capacity building</i>: Greater financial flows into countries would not only support economic development but would also strengthen environment and natural resource preservation. 4. Increasing international commitment to climate change mitigation and the global CO₂ voluntary market. 5. Local government is willing to reform and establish the institutions and legal framework for PES implementation. 6. PES funds would be sustained by potential service users and other donors. 7. PES schemes are encouraged by local government and communities and benefit from their involvement. 8. PES in the region represents an attractive collaboration opportunity for international donors (individuals and organizations). 9. Good experiences from other developed and developing countries, especially from the useful lessons learned from the national PFES policy in Vietnam (after two years of pilot implementation).	1. Difficult to protect the interest of service users when there is no evidence to illustrate the correlation between payment and ES quality. 2. Uncertainty of financial resources from international donors and governments. 3. Carbon sequestration payment mainly depends on the global community and market. 4. Participants complain of inequity with flat payment mechanisms and limited ES. 5. A lack of human resources for evaluating the value of ES as the basis for payment calculations. Hence, if the payment relies on negotiations, service values can be underestimated, and therefore do not encourage participants to improve ES. 6. Hydrological impacts of forest interventions are largely site-specific and additionality is hard to prove. If buyers are unsure that they are getting what they pay for, sustainability is doubtful. 7. It takes time and money to establish the monitoring system and gauging stations for ES assessment. 8. Experience in establishing a legal framework for PES is low and can conflict with current regulations. 9. Common equity constraints include: insecure tenure, weak local institutions, and inequitable public enforcement capacity. 10. Beneficiaries are often poor and/or unwilling to pay for a 'free good' or their basic right to water; it is difficult to exclude beneficiaries who won't pay. 11. PES drivers are mainly donors and the fund for project preparation is usually based on one-off donations. This affects the sustainability of PES schemes. 12. Payers do not trust the planning, distribution, and accountability of PES fund. 13. Environmental investment is difficult to come by unless the basic social services of communities are met.

Although PES schemes provide multiple benefits, including direct incentives and benefits to local people, there are still that must be addressed, such as the impact of poor governance and limited institutional capacity to establish and apply rules. In addition, because there is no evidence to illustrate the relationship between payment and ES quality, service users do not really trust the efficiency or effectiveness of PES schemes. Another issue that challenges the sustainability of PES schemes in the long term is the fact that most PES schemes in SEA have been driven and sponsored by national or international organizations, support which only lasts for a limited period.

However, it is clear that PES is a potentially efficient tool for ES management and that the trend to apply this tool in developed and developing countries is increasing. Moreover, as the world population is increasing, the demand for ES is also going up, which opens up a real opportunity to expand PES in the region.

So far, PES is considered as an efficient environment management alternative to the traditional CAC mechanism. Hence, PES is supported by local governments and communities and they are willing to reform and establish the necessary institutions and legal frameworks for PES implementation. Additionally, the acceptance of the PES mechanism is increasing all over the world and the global CO₂ market is improved significantly. There is therefore a great potential to apply PES properly in the future.

However, in order to implement PES efficiently and effectively, organizers will need to solve the threats that arise in the implementation process. In particular, they will have to convince buyers and users on the value of paying for services, move from using funds that come from donations to funds that come from service users, set up the necessary institutional and legal mechanisms and frameworks for PES implementation, and work to ensure equity when it comes to both payments and participation. Thus, it can be concluded that for a successful PES framework, the key factors are rigorous data inventory and modeling, a good analysis of stakeholders and institutions, and effective governance in the local context.

6.0 CONCLUSIONS AND RECOMMENDATIONS

This study looked at 12 PES schemes from four countries in SEA. It finds that the development of the schemes has been driven by national or international donors, and that they have been set up to deal with degraded environmental services, deforestation, degraded water resources, and inefficient environmental CAC mechanisms. Although these schemes have not strictly followed all the criteria mentioned by Wunder (2005), they have, in the main, met the main objectives of PES implementation. However, instead of employing user-payment mechanisms, most have been primarily funded by donors, the private sector, and local government. They have also only dealt with a limited number of environmental services such water quality and quantity via forest restoration, flood and landslide control, carbon sequestration, biodiversity, and landscape beauty.

Besides aiming to improve environmental service quality, most PES schemes have also aimed to help alleviate poverty alleviation and drive social development. However, because individual land tenure is not secure in most of the countries surveyed, participation in PES plan has been limited to specific communities or particular locations. At the first stage of PES application, the institutions, governance mechanisms, and legal frameworks for the approach are restricted; nevertheless, PES is still seen as an efficient environmental and natural resource management mechanism.

The survey of PES implementation shows that these schemes have generated a number of positive environmental, economic, and social impacts. In particular, thanks to the projects, approximately 375,232 ha of forest has been reforested and protected from illegal logging and agricultural conversion. Because of this addition of forest area, it is possible to state that PES schemes have contributed significantly to the improvement of environmental services.

In terms of economics, most of the studied cases have generated additional short-term household income through labor payments, and additional income from agroforestry and via the implementation of conservation technology and practices. Consequently, this payment has helped increase annual household income from 2% to 30%.

Moreover, PES schemes have also had a positive impact on social development. For example, they have increased the awareness of local farmers and authorities about environmental service values, PES implementation, and its potential applications. The cohesion of rural society has also been improved through PES projects in which contracts are signed between groups of farmers. Additionally, service users involved in PES schemes have helped improve social conditions by providing ground water collection devices, roads, schools, medical clinics, and nourishment programs.

However, most PES schemes in SEA countries have been implemented with limited financial resources (donated by the private sector, international organizations, and governments) and have no plans to sustain funding beyond the initial start-up and implementation phase. Hence, such programs finish after two to five years. This problem is highlighted by the greater sustainability of those schemes that have financial resources from service users (such as payments for environmental service use or resource use taxes

and fees). Furthermore, local institutions and legal frameworks play a fundamental role in establishing and implementing the payment mechanism. In addition, several new regulations and rules have been issued such as Decision 380 and Decree 99 in Vietnam.

Although, PES schemes have created a good impression in the region, there are still a number of issues related to their implementation. These include a lack of equity, the fact that their ability to contribute to environmental service provision are limited by weak individual land tenure, and the fact that some schemes were ineffective because of the weak PES governance, institution, and regulations. Besides these, PES schemes are also faced with the difficulty of establishing the relationship between payments and environmental service quality and measuring changes in environmental services, problems that are exacerbated by the limited capacity of local staff and farmers. Moreover, many payments have not been based on service value or opportunity costs and this has led to poorly judged service values, which have had a negative effect on fund contributions. Finally, at the first implementation or pilot stage, payment conditions and monitoring systems have often been weak. Consequently, the rights and obligations of stakeholders could not be evaluated accurately.

In order to deal with these existing challenges facing PES schemes and to make sure that the next phase of PES projects in SEA are implemented as effectively and efficiently as possible, the following recommendations are made:

- **Secure the land tenure of participants.** This must be done because clearly defined property rights enable parties to enter into PES contracts and also help ensure the sustainability of PES schemes (Greiber 2009).
- **Improve existing regulations and rules and establish a stronger legal framework to support the application of the PES mechanism.** As has been shown, the legal context in which a scheme operates can determine its success or failure. A clear and coherent legal framework will ensure that good governance is taken seriously in public PES schemes, will create legal certainty and consequently trust among the parties, and will help stimulate the creation of a market for PES (Greiber 2009). The importance of this recommendation is highlighted by the success of the PFES policy in Vietnam, which is based on the issuance of Decision 380/QĐ-TTg2 (2008), and Decree No. 99 /2010/ND-CP (2010).
- **Establish finance regulations for PES funds and ensure that such funds are controlled by the relevant government financial department.** As Greiber (2009) indicated, the success of PES schemes is highly dependent on funds being available to provide capacity building, make sufficiently high payments to ecosystem services providers, ensure PES monitoring and enforcement, and eventually renew PES contracts after their termination. Most payers and donors are not confident to pay unless the schemes they are paying into are regulated and monitored properly.

In addition, the funds for PES schemes must be obtained from a sustainable financial resource instead of via limited donations or from a fixed-term source. Hence, any new PES finance regulations should specify that sustainable payments should be made by service users through a tax, fee, or environmental service charge, or that payments should be made through a dedicated government fund. A well-functioning system of finance in each country is essential to secure efficient and equitable allocation of payments.

- **Clearly define environmental services, stakeholders and related requirements.** As PES is still a relatively new concept in the region, it is vital to define all aspects of any scheme and explain them to all stakeholders, so that they understand what is involved and are persuaded to participate. In addition, each environmental service is worth a different amount; hence, all paid values should be estimated directly or by using the opportunity cost of creating the service. Sellers, payers, and intermediaries should all be clearly determined, as should their rights and obligations.
- **Compose a specific PES contract including payment conditions and evaluation indicators.** As should be set out in any PES legal framework, the PES contract should be considered as an official document. It should mention the rights, obligations, rewards, and punishment between parties. The contract should be signed directly by service providers and users or through an intermediary (as defined by the relevant legal framework). Because the allocated land size per person in SEA is normally small, contracts should be signed by groups of participants to reduce transaction costs and management headaches.

- ***Set up a group of technical experts to evaluate the baseline of environmental services and to measure the relationship between payments and changes in environmental service quality.*** The evidence from this step would persuade service users to pay and would encourage service providers to improve their contribution. In addition, this team could monitor environmental service quality and provide support to help set up the guidelines for any equity payment mechanism.
- ***It is recommended that PES projects should be piloted first*** in order to figure out the strengths, weaknesses, opportunities and threats that are specific to the project's unique context. By conducting pilot projects, risks can be avoided and costs minimized. For example in the PFES project in Vietnam, several problems were ironed out after the pilot period.
- ***Information relating to PES schemes and their implementation should be openly delivered to stakeholders*** through media such as radio and television, as well as through local institutions (including government and NGOs). As the experience from Vietnam shows, local institutions and local participant meetings are very efficient mechanisms for information dissemination. Furthermore, community involvement is essential to enable PES schemes locally. Hence, information on PES is needed for community education and outreach to convince local people to participate.
- ***Payments for environmental services should be a combination of cash and in-kind payments*** because the protection of environmental services will be more effective if it is linked to improvements in the living standards of local people, their skills and knowledge of cultivation, and local infrastructure. Hence, cash and in-kind payments would motivate different aspects of these improvements. In addition, in-kind payments can be made as land tenure in order to secure individual land rights and enhance collateral.
- ***Finally, PES scheme cannot be sustained with only one paid service and only one payer.*** In addition, each eco-system (e.g. watershed) usually provides a number of services; hence it is often possible to expand the number of paid services as a way to enhance the fund, as well as to create equity among service users. On the other hand, payers should be determined by current users and by the potential of the environmental services they are using. In addition, at the initial stage when users have not been determined and have not been paid, the fund should ask for donations from the government, NGOs, and international organizations. Hence, in order to sustain PES implementation, the implementer should ask for funding from as wide a range of financial sources as possible.

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APPENDICES

Appendix 1. Checklist frame for reviewing PES context in each case

Items	Philippines			Indonesia			Cambodia			Viet Nam		
	Case 1	Case 2	Case 3	Case 1	Case 2	Case 3	Case 1	Case 2	Case 3	Case 1	Case 2	Case 3
Where? (General location features)												
What alternative policies/projects were implemented?												
Potential of PES? (Pressures on natural resources: increase in water demand, additional land, food, energy; watershed degradation; CO ₂ emission) Ineffective traditional management projects? Shortfalls in government expenditure? Inequity between service users and suppliers (no payment for the poor)?												
Purpose? (Improve the availability and quality of ES, user-pay mechanism, cost-saving tendency; provide property rights or tenure security; poverty alleviation)												
Drivers of PES? (Government, NGOs, private investors, sponsors)												
Finance sources? (service users, NGOs, government, other sponsors)												
When did it start? Services chosen?												
Payment mechanism? (direct or indirect)?												
Planning?												
How does the process go?												
Implementation?												
Total cost of the whole process? How much of the costs are not payments for ES providers?												
Legal basis?												

Appendix 2. Checklist for PES process analysis

Items			Checklist
Preparation	Stakeholders identification	Buyers	Who used the ES (direct/indirect)? What kind of ES they are using? When using these services, do they have a duty to pay? How do they pay for these services (payment mechanism and types of payment)? How long and how much have they paid for these services?
		Sellers	Who generated/protected/managed the ES? Area (location and size)? Types of services? How do their generation, protection and management relate to ES? Who are sellers (individual or group)? How much and how they are rewarded?
		Intermediaries	Who managed PES (government, NGO, private sector)? How is it managed? Their roles and duties?
	Environmental service identification		What kinds of ES are paid for (watershed, CO ₂ , biodiversity, landscape)?
	Service evaluation for payment		Market-based or non-market based evaluation of ES (willingness to supply), opportunity costs (labor, land uses), forgone income, donation, subsidy...
	Design elements of payment mechanisms	Contract design	Who designed the PES contract? Contract types? How was it designed? Is it a product of bottom-up or top-down approach? How was the contract formed? Are the rights and responsibilities clearly mentioned in the contract? Contract duration?
		Type of payments or rewards	Cash payment? Secure access to land for farming? Technical assistance or training? Financial support programs/conditional access to credit? Education/health-supported programs? Local infrastructure improvement programs?
		Fee structure and targeting	Direct or indirect payment? Flat or differentiated payment by hectare? Annual, monthly, or quarterly payment?
		Transaction costs	Total transaction cost/PES's benefits rate? Fund sources for transaction cost? How does transaction cost impact on payment level and program maintenance?
	Supported legal framework		Which governmental policy and regulation is the PES case based on (if any)? What legal and regulatory frameworks at the regional or national level support it?
Implementation	Organization and Management		Pilot or not? Who manages PES? How is it managed? Duties and benefits? Time frame of PES implementation? What are the transaction costs (source? user? clear? efficient? ratio of cost and total payment)? Method of payment and allocation of collected money? Expenditure report? What was the wealth ranking of the payee? Were the payments equally allocated among the service providers/sellers?
	Progress		Who provides support in what for each step in the whole process? How were the stakeholders brought together into the negotiation? Who organized? Who supported? Who participated? For how long? Who was the coordinator? How did the stakeholders communicate? Are there communication channels/feedback channels in the implementation process?
	Scale		Application scale (local, regional, national) for each specific service or all services?
	Monitoring process		Who monitors PES? What are their responsibilities? What do they monitor? Based on which criteria/indicators? Applying which method/process? How did they monitor? What is the time frame for monitoring? To whom do they report the monitoring results?

Appendix 3. PES evaluation framework

Criteria	Checklist	How to collect	Where to collect
Effect: Are targets realistically achievable?	• What is the target? • How is the target achieved? • By how much is the target achieved? • Is the target suitable for the local context? • How is the PES linked to the policy background? • How are the stakeholder's decisions put in the mechanism? • How is the information about the PES model transmitted to all stakeholders (so they clearly understand, and are able to make decisions/choices)? • What are the benefits for the PES participants? • How many people participate in the PES? • What are the costs/trade-off (investment, time, etc.) for the PES participants?	• Review of cases • In-depth interview • Rapid appraisal	• Internet • Previous case studies • PES management board in each country
Efficiency: Is the pathway to achieving the targets cost-efficient?	• What are the transaction and monitoring costs? • What is the rate of the transaction cost compared to the payment? • What is the impact of these costs in the sustainability/maintenance of the PES in the long term? • Are transaction and monitoring costs reasonable as part of overall inputs?	• Review of cases • In-depth interview • Direct observation	• Internet • Previous case studies • PES management board in each country • Secondary data
Equity: Allocation of costs and benefits are considered proportional to social norms?	• Was the PES equitable? (equity in access, equity in decision and equity in outcome) • What were the impacts to local communities (the poor and ethnic groups) • What level of representation is used in negotiation and what safeguards are in each area?	• Review of cases • In-depth interview • Direct observation	• Internet • Previous case studies • PES management board in each country
Legal feasibility: Does any support come from the government's legal framework?	• What governmental policies and programs is the PES case based on? • Is there any government regulation for PES implementation?	• Review of cases • Review policies • In-depth interview	• Internet • Previous case studies • PES management board in each country
Financial feasibility: How is the PES implementation maintained in terms of finance?	• PES implementation fund sources? • What were the costs of the implementation process? • Ratio of involved cost and total payment? • Method of payment and use of the money paid?	• Review of cases • In-depth interview	• Internet • Previous case studies • PES management board in each country

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